

How to Relax and Enjoy Your **HOME & PERSONAL COMPUTER**



Easy Steps to:

**DECIDE WHAT
YOU NEED**

**PICK THE RIGHT
SOFTWARE**

**BUY OR EXPAND
YOUR SYSTEM**

History will record as a profound irony
that the most powerful word processing package
ever created for the IBM® Personal Computer
wasn't created by IBM.

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IT'S EASIER THAN YOU THINK

Home and personal computers represent one of the fastest-moving industries in history. If the automobile industry had advanced as rapidly as computers, cars would cost \$2.50 and get two million miles to the gallon.

Hardware technology that was available yesterday only to major corporations, can be at your desk or in your family room today. What

was large is now small and soon will be micro.

Software for entertainment, education, productivity and business is available now for low-cost personal computers and is multiplying to meet demand. The impact of new communication packages, integrated software and data base management was described in futuristic terms only a few months ago; yet all are available at retail this fall.



EPSON

Thanks to lower cost and easier operation, the personal computer has won a place in millions of American homes.

COMPUTING YOUR PERSONAL FUTURE

With personal computer power now within reach of everyone, the "information revolution" is fully under way.

Practically overnight, well over 2 million personal computers have been sold at retail and are in use. That number will double in the next 12 months—and double again by 1985, according to KQED, Inc., a non-profit computer education publisher in San Francisco. By then, KQED pre-

dicts 11.5 million personal computers will be in use—one for every 20 people in the U.S.

Perhaps the most "personal" aspect of the personal computer is the fact that there is no longer a need to become a "computer nut" to master computer power. Your primary need is a clear understanding of the work you expect to perform with your computer, with less regard for the "bits and bytes and BASICs" of the hardware.

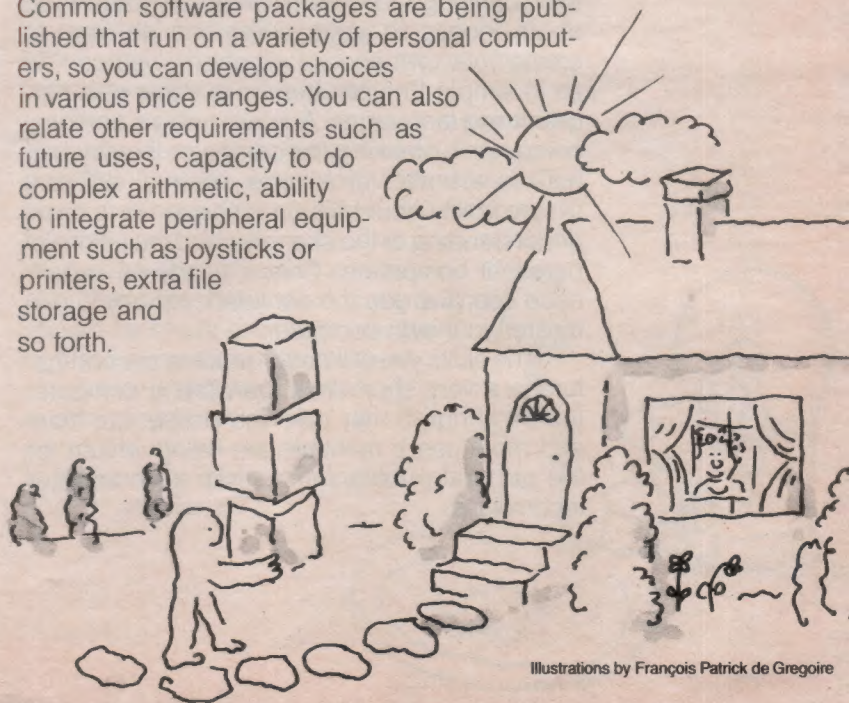
"People who can tell you what they would like to do," says one specialty retailer, "are beginning their affair with personal computers in the best way. As the romance continues, they learn more about what they can expect... but not necessarily any more about what makes a computer tick—or blink.

"It's obvious that we drive cars for very practical purposes," he continues, "and that we use them for pleasure as well. We can learn more about places to go without knowing anything more about carburetors or drive shafts."

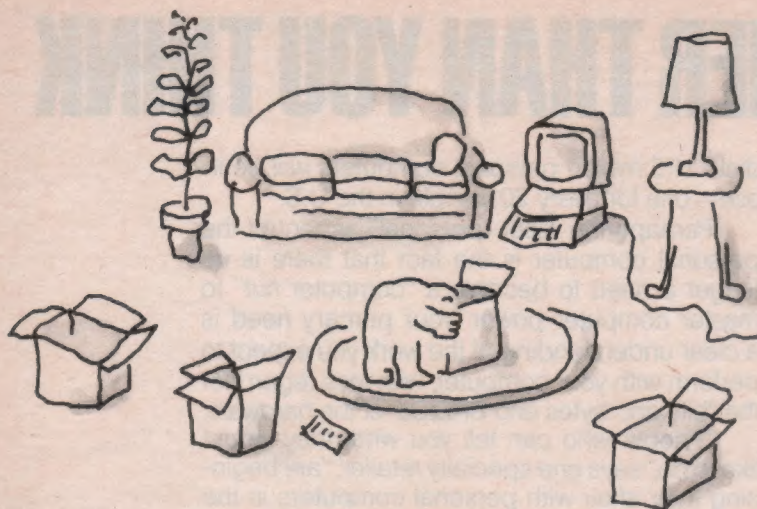
Begin at the beginning is prudent advice for anyone entering the world of personal computers. A pattern is emerging that suggests, "Think first about how you, personally, get things done. How you work. What you want to do and how to make it easier and more efficient. Or more fun."

The second step is to find the software that will help you do the job...or play the game. Software is a set of custom instructions that you pick and put into the computer to make it do what you want it to. More simply, software is the roadmap that your computer will follow.

Only after the selection of software are you ready to make knowledgeable judgments about the hardware. "What models will run the software I want or need?" is the next logical question. Common software packages are being published that run on a variety of personal computers, so you can develop choices in various price ranges. You can also relate other requirements such as future uses, capacity to do complex arithmetic, ability to integrate peripheral equipment such as joysticks or printers, extra file storage and so forth.



Illustrations by François Patrick de Gregoire



COMPUTER LITERACY

Your ability to harness the power of personal computing in your daily life depends upon your ability to accept new ideas, develop new attitudes and utilize them. It's like accepting the typewriter after you've worked for years to perfect your penmanship.

"A lot of first-time buyers are fulfilling a wish," says one industry observer. Very quickly, they fit themselves into one of two categories: those who see the computer as a novelty "able to play games and help the kids learn more readily," and those who "perceive the computer as an extension of personal skills and intelligence."

Current fears about computers are based on some common misconceptions: "I have to be good at math to operate a computer." "I'm not very technical." "I'll have to learn a computer language and become a programmer." "I can't trust my work to a machine that may devour it and never give it back."

The major advantage of today's personal computers is that you don't have to learn about the technology—or even learn to program, if you don't choose to. And, when you do want to create your own special programs, you can do so in simple English, thanks to advanced programming languages. Actually using a personal computer—breaking the computer literacy barrier—is a matter of attitude, minimal skill and simple ability. Your attitude is shaped by a basic understanding of the strengths and limitations of personal computers. Only a hands-on experience can give you the confidence that you can master your own computer.

The skills you will need become second nature in a very short time. Translating computer talk into English may give you pause, but more and more user's manuals are being written for the general public, rather than for computer technicians.

You're entering the world of personal computing at an exciting time. While you achieve computer literacy, the industry itself is striving to cater to your needs.

If you enter the world of personal computers judiciously—define the function, identify the software, settle on hardware—you can reasonably expect to achieve your goal. But, just as the industry is advancing rapidly, so too will your expectations. Tomorrow, there will be simpler, more powerful, less expensive personal computers. The machine you buy today may well be discounted deeply. But if you wait for the ultimate machine, you may wait forever. If you begin with an affordable system, you can expect to add capabilities later, or join the growing legion of "second-time buyers" and "two-computer families."

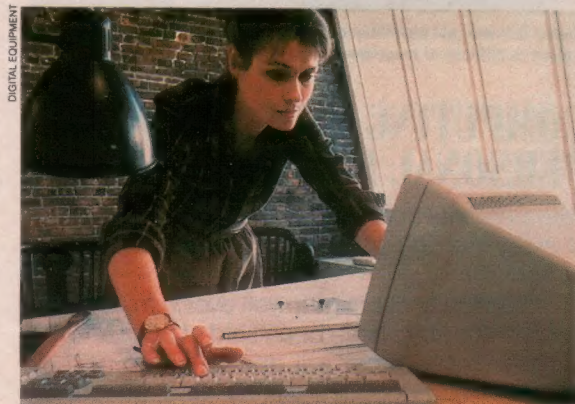
SMALLER, FASTER, BETTER

How did the personal computer come about?

Early computers—using old radio-like vacuum tubes—evolved into today's large computer systems with the invention of solid-state components that made advanced electronic circuits possible. Computers then could fit into special rooms and be affordable, at least for major corporate users and early innovators.

Paralleling the expansion of information within our society, computers became cheaper, smaller and more powerful. Computing power comparable to that of the early mainframes now costs pennies and is contained on a silicon chip that's smaller than a dime. The computer chip is, itself, the product of information processing advances and an example of the accelerating rate of technological progress.

With the invention of the minicomputer, com-



Computer power that once was limited to large corporations, now can be on your desktop—adding to your work efficiency.



With the latest design advances, you don't have to be a technician or engineer to harness the power made possible by the personal computer.

puter power for the '70s could be installed in less space than a washing machine. Digital Equipment Corp. (DEC) was one of the first to produce minicomputers commercially, and one of the major survivors of the great minicomputer manufacturer shakeout later in the decade. Today, DEC is the world's second-largest computer company.

According to a DEC spokesperson, "Personal computing began with the first minicomputer because from that day on, access to information became easier and easier for people with less and less dependence on computer experts in the day-to-day processing routine."

The first wave of personal computers used 8-bit silicon chip technology. Then in the early '70s, Intel Corp. designed a new chip for Datapoint Corp. Intel made processors for minicomputers; Datapoint made small computer systems. The new chips were designed to streamline processing for larger computer systems. However, the finished product, the Intel 8008, was slower than Datapoint wanted. Datapoint cancelled the order, and Intel was left holding the chip.

Chips then became integral parts of kits that electronic enthusiasts used to convert television sets into first-generation home computers. From their garages, electronic tinkerers such as Apple Computer Co. co-founders Mike Wozniak and Steven Jobs designed, manufactured and marketed these early kits. Other early innovators, such as Radio Shack, saw the potential for personal computers and began using the 8-bit chips in their first models.

By 1980, what had begun as "large-scale integration" became "the computer on a chip," and minicomputers moved into the market from

two ends of the spectrum. High-technology micros like the IBM Personal Computer—the first personal computer to use 16-bit chips—and the DEC micro-based model PDP-11 quickly carved out a niche in corporations and also began to appear in retail outlets.

Meanwhile, the computer chip appeared in lower technology devices—first as arcade games, then as home television game machines. Inevitably, game machine manufacturers expanded their computer capabilities to offer full "home computer" functions.

Today's market is not limited to a handful of common names like DEC, Apple, IBM, Radio Shack, Commodore and Texas Instruments. GML Corp.'s "1983 Microcomputer Review" lists more than 675 available computer models.

Most new personal computers use 16-bit chips, although 8-bit machines still sell well because of their generally lower prices. (And, while most software developers turn their attention to the new, 16-bit machines, there are literally thousands of good software programs available to run 8-bit computers.)

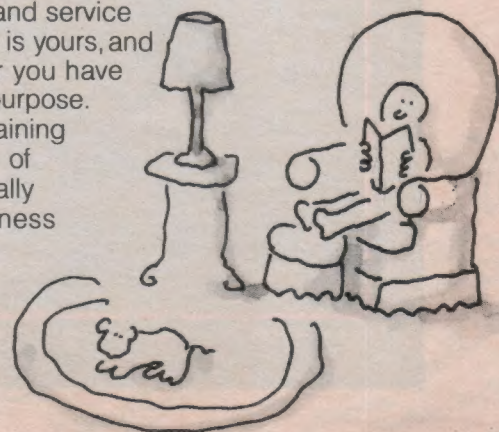
What the individual buyer can expect to find is a retail offering that ranges from small handheld computers to full-scale "supermicros" for small businesses. These personal computer models are available at mass merchandisers, computer specialty stores and, in the case of high-end, high-cost systems, from business machine dealers.

HOW TO LEARN MORE

Walk into your favorite department store and you'll probably see a display of personal computers and software ready to put in your shopping cart to take home. But you'd better be ready to find your own way through the maze of instructions and start-up procedures.

On the other hand, if you go to a computer specialty store, your chances of finding knowledgeable people and informative demonstrations improve considerably. Your choice is basically one of lower price and less capability vs. greater sophistication and service at higher cost. The choice is yours, and should be made only after you have defined your computer purpose.

A new trend toward training is emerging in the design of computer stores—especially in those catering to business and professional



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Almost anyone—no matter what level of technological sophistication—can master the personal computer with a little hands-on experience.

buyers. Bob Katzive, vice president of the computer division of Gnostic Concepts, Inc., a market research firm in Menlo Park, California, estimates that 40 percent of computer stores are making some provision for training areas. "That means room set aside for educational purposes, not a machine in the corner that they point to and say, 'That's our training unit,'" he says.

Responsible dealers are making it easy for customers and potential buyers to learn about computers. In addition, they are supporting adult education classes and local computer societies.

In companies where the personal computer has become a professional necessity, in-house or contract training sessions offer an opportunity to learn more about the company's personal computer strategy.

And one of the functions that personal computers perform particularly well is teaching. Not only can you learn a language, increase your word power or take a typing course, but manufacturers are also supplying "tutorial software" designed to take you on a step-by-step tour of your personal computer's potential. Software suppliers are publishing similar self-help programs to introduce you to expanded capabilities of both your computer and the particular software you want to use.

If you're still apprehensive about personal computers—before or after you buy—there are

still other ways to put your mind at ease. Most local school systems offer computer courses not only for your children, but also for you in continuing education classes. Similar courses often are available at local colleges and YMCAs and YWCAs.

Computer "camps" also are springing up around the country. Based on traditional summer camps, but with computers, many of these are designed for children. But some summer courses are available for adults. Your local computer store or computer society usually will have detailed information.

Computer societies themselves are a great source of information. There are societies in most metropolitan areas. They offer various educational courses, a great deal of general information and even more detailed information through user groups. These groups include members who own or are interested in a particular computer model or application. You don't have to be a "techie" or a "computer nut" to join, just a person with an interest in learning.



WRITE, COUNT, SAVE AND PLAY

People ask daily, "Which computer should I buy?" and fully expect that there is one correct answer. Not only is there no single correct answer, that isn't even the right question.

If you are one of the approximately two million Americans who will buy their first personal computer this year, the question to consider is, "What do I want to do with a computer?" First define your needs and goals. Before wondering what computer to purchase, decide what it is you want to accomplish with your computer.

"It may sound strange coming from a hardware designer," says George Morrow, founder and president of Morrow Designs, a computer manufacturer in San Leandro, Calif., "but always choose your software before your hardware." Morrow recommends that approach for any first-time buyer—whether a home computer "tinkerer" or the executive responsible for automating his department within a large corporation.

Successful users are those who decide first what it is they want to do with a computer and are willing to take the time to learn how to use it. That needn't be a long, complicated or intimidating process. Just follow the steps in this supplement on how to select your personal computer, then take a few days to learn how to run it and make it work for you.

A computer can do a great many things, but basically it processes words or numbers, manipulates lists, and stores and retrieves information of all sorts.

The applications can be just about as imaginative as you can be. Take, for instance, the father of one enterprising Girl Scout who helped his daughter computerize her list of prospective cookie customers—and personalize a form letter to them. And there's an executive who often spends her evenings playing complicated "what if" simulation games with her company's financial forecasts.

And, perhaps most important to many parents, the same computer they use for personal finances and word processing can be used by their children for a variety of educational games. Such games give children an early introduction to computers. "After all," notes one consultant, "kids will be confronting computers all their lives."

The main uses of personal computers are entertainment, education, managing your home—or business—and improving your personal productivity. Applications can be just about as imaginative as you can be. There are literally thousands of things you can do with a personal computer. Here's a quick sampling:

Learn things. You can improve your bridge game, brush up on a foreign language, help your child learn arithmetic and spelling, identify the constellations, improve your memory, teach yourself and your child programming.

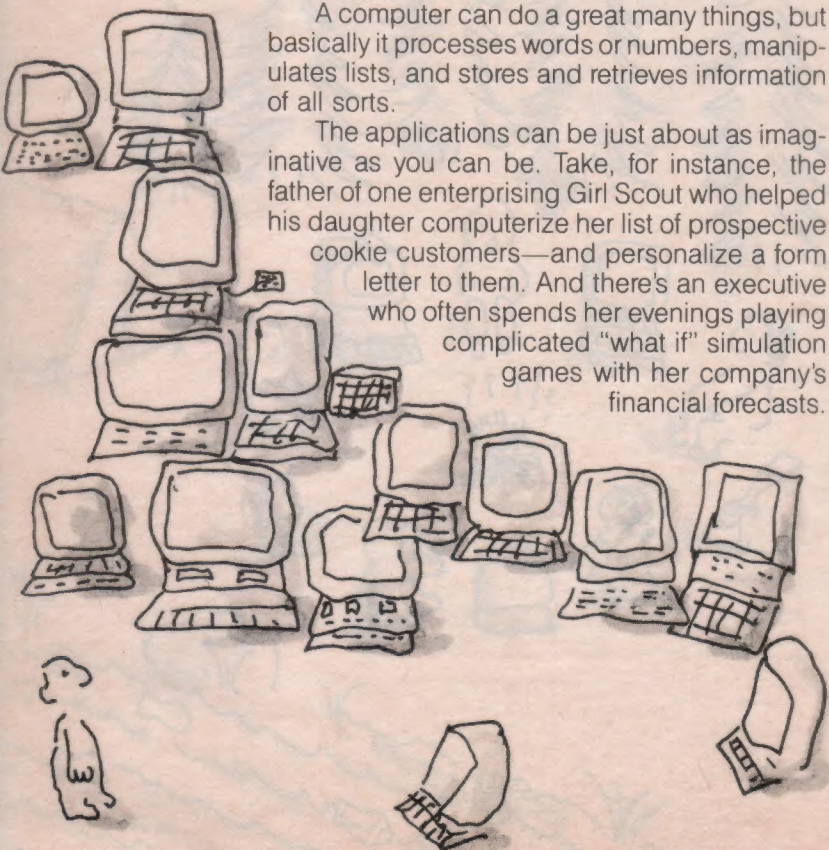


The personal computer can handle family financial planning tasks easily—from balancing a checkbook, to calculating mortgage costs.

If you don't know how to operate a personal computer, or even if you don't know how to type, there are programs that can teach you that, too. Apple Computer likes to point out that more educational "programs" run on its computers than on the Public Broadcasting System.

Work with numbers. You can forecast corporate or personal cash flow, make pricing decisions, balance your checkbook or analyze a real estate investment.

Each April, one of the hottest selling software programs is one designed to help you fill out your federal tax returns. Many such pro-



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Why do so many people buy personal computers at Entré Computer Centers?

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Entré can help you bring the right personal computer into your corporate or professional office—whether you're buying for yourself, your department, or for the whole company. At Entré, you can count on doing business with business people who understand your special needs. Our professional Systems

Consultants work with you, in our Centers or at your site, to determine how a personal computer can boost your personal productivity, and fit into your company's profit picture. Then we'll recommend the system that will help you, and help your company. Today, and for the long run.

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grams make it much easier for you to assess which type of tax form to use, whether you should try income averaging, and the like. In some areas, programs are also available to help you with your state income tax forms.

Manage lists. With a home computer, you can file and easily update your Christmas card list, keep track of professional associates, keep your grocery inventory, computerize your telephone file, keep an appointment diary or keep track of your expense account.

In many programs, lists can be merged with other lists or with letters or notes you have written with a separate word processing program. In that way, you can personalize form letters.

"Talk" to other computers. With optional communication software, you can use your personal computer to check airline schedules, order airline tickets, keep up on the latest stock market quotations, even read the day's news.

If your friends or business associates have similar programs, you can send and receive messages, called electronic mail. You can also communicate with the computer in your office.

Make things run. Personal computers with other optional equipment can make things happen around your house. It can dial a busy tele-

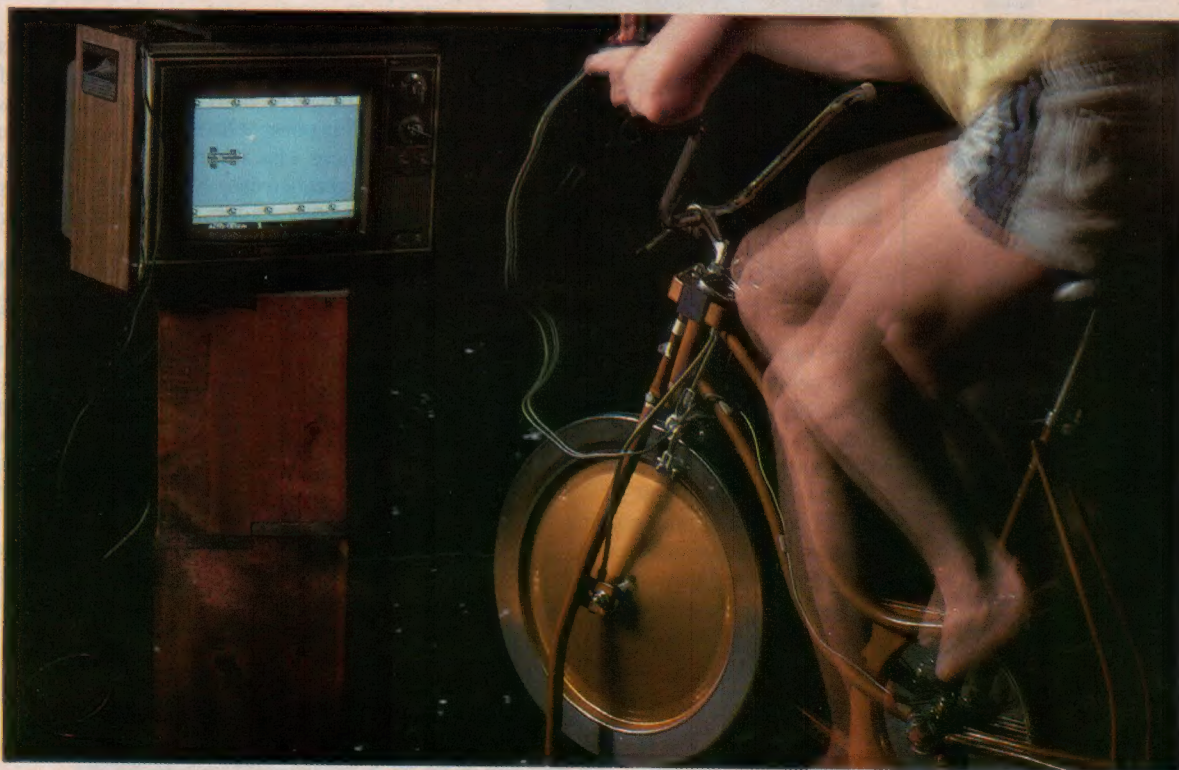
phone number until the line is free, regulate your water heater's temperature, turn lights on or off while you're away, monitor a burglar alarm system, even activate your microwave oven.

Apple Computer learned of a customer who had rigged his personal computer with a sound-sensitive device and a home-made mechanical contraption to automatically rock the cradle whenever his baby daughter started to cry.

Draw. Computers with graphics software can make rows and rows of numbers easier to understand and analyze by converting them into pie charts or graphs. More sophisticated graphics software can help you design your own graphics for games—or give you a hand in drawing plans for an addition to your house.

Play games. Computers can also play games—an amazing number of games. You can challenge a friend or the computer to a game of chess, bone up on Scrabble, repel invaders, solve puzzles, handicap horse races, try to predict the outcome of actual football or baseball games, or rescue a woman from a King Kong-like ape.

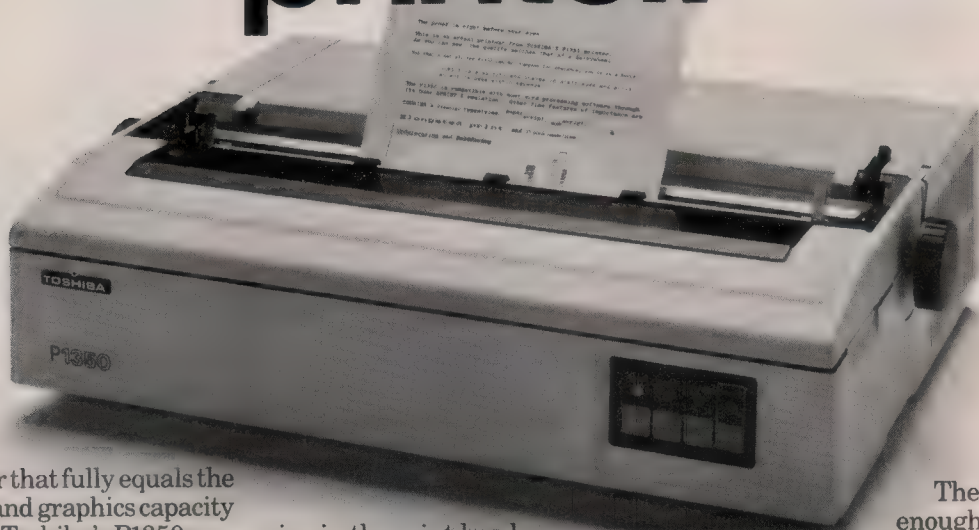
"There are anywhere from 11,000 to 20,000 programs written specifically for the Apple II alone," notes Robert Marák, manager of Macy's



Just because you're now using a personal computer, that's no excuse for being chairbound. Your PC can also help keep you fit and healthy—by directing your diet, watching your weight, and measuring your progress while you exercise.



Nothing shows off your IBM PCTM like Toshiba's P1350 printer.



Now there's one three-way printer that fully equals the word processing and graphics capacity of your IBM PC: Toshiba's P1350.

But the P1350 is more than compatible with PC hardware. It is the only printer that will print programs like LotusTM 1-2-3TM data processing and graphics output with remarkable character definition.*

For even more flexibility, the Toshiba P1350 with Qume SPRINT 5TM emulation handles all popular word processing programs. Under software command, the P1350 will print high-speed drafts or switch to letter-quality text and graphics.

The innovation behind this three-in-one flexibility is Toshiba's print head. Pin diameter has been reduced to just eight mils. And the number of

pins in the print head has been increased to 24.

The result is a superior 360 by 180 dot-per-inch density pattern in the text mode. Instead of spinning your wheels at 40 cps, the P1350 produces letter-quality printing at 100 cps. In its draft mode, Toshiba's P1350 can accelerate up to 192 cps.

When it comes to graphics, the P1350 really shows its stuff. Whatever your computer displays, Toshiba's P1350 prints. With astonishingly clear definition. And extra-fine reproduction that can only come from a print head capable of 200 million impressions and exclusive 180 by 180 dot-per-inch graphics density pattern.

Then, if that's not enough to pique your interest, the P1350 also

features three different fonts. Variable pitch. Subscripts, superscripts and underlining without the need of a second pass. A super-reliable optional sheet feeder. And more.

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In Touch with Tomorrow

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TAKE YOUR COMPUTER TO WORK

There's no doubt about it. Mastery of personal computers is a professional status symbol, a sign of achievement.

Once you master a personal computer and realize the range of functions it can handle, you develop "a creeping commitment," says Portia Isaacson, president of Future Computing, Inc., a Richardson, Texas market research company. A professional may start out with a personal computer to handle his home finances or to write memos in his spare time. But quickly, Isaacson says, he will start doing work at home.

One study by International Data Corp., a Framingham, Mass. market research firm, shows that half of all personal computers are used both at work and at home. A Future Computing study shows there is a "tremendous crossover" between business and home computing. When executives buy a computer, Isaacson says, they often want it to be compatible with their office system so they can work at home. The reverse is also true, the study says. When executives are responsible for buying an office computer, they usually want it to be compatible with their personal computer at home.

If you don't want to carry a 30-pound computer between your home and office, consider compatibility factors. Will the floppy disks that run on your office computer also run on your home computer? They

don't necessarily have to be the same machine to be compatible. But ask first.

Isaacson debunks the theory that executives want a personal computer that can compute at work and play games "for the kids" at home. In fact, she says, executives want to be able to play sophisticated computer games during their free time, too. "It's usually the case that the kids get to play games on the computer only when Mom and Dad have finished," Isaacson says.

Small home computers that are designed primarily to play games probably won't be able to handle your personal finances and almost certainly won't be compatible with any computer in the office. On the other hand, if you buy a personal computer that is compatible with your office system, chances are you'll still be able to play games.

In fact, some of the most sophisticated computer games are being developed not for games-only computers, but for professional-level computers such as Apple Computer Co.'s Apple II and III and IBM Corp.'s Personal Computer. These computers are also the biggest sellers to small businesses and to departments of large corporations.

Work and games: they're what Isaacson calls the "dual motivation" in buying personal computers. People—professionals included—generally want to be able to do both with their computers.

computer department in San Francisco. "That gives you some idea of what is possible with a personal computer."

Whatever it is you want a computer to do, make that decision first. Then you can begin shopping for the software you'll need to accomplish those tasks. After that, you'll be prepared to buy a computer.

WHAT COMPUTER BUYERS ARE SAYING

Take this advice from some experienced computer buyers.

Venture Development Corp., a market research and management consulting firm in Wellesley, Mass., recently surveyed several hundred customers at retail computer stores. The customers, mostly small-business executives, were about equally divided between first-time and repeat customers.

The study found that among the first-time buyers, selection criteria were largely related to hardware issues. For example, these customers ranked good hardware service and maintenance

as the most important consideration in their choice. Reliability of the system and its ease of use ranked second and third, respectively. At the same time, these customers rated software and the ease of programming a relatively low eighth in importance.

But among repeat customers, software and the ease of programming was listed as the most important factor—by a wide margin.

"The first-time customer just wants a good, reliable machine that's quick and easy to maintain, service and use," explains Timothy F. McMahon, manager of Venture Development's Computer Consulting Division. "But there is a learning effect here, and when a more experienced customer is buying a computer, he does understand the importance of software and programming."

That's not to say hardware considerations aren't important. It's just that, according to experienced computer buyers, the selection of software first is the most important factor. These same buyers ranked hardware, maintenance and service, reliability and ease of use as the next three most important issues, in that order.



How to keep the computer revolution from becoming a revolt.



Computers are creating a revolution in the way we work. But because they sometimes lose or confuse information, they also create frustrating problems.

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SOFTWARE: THE VITAL LINK



revolution is taking place in the world of computers today, and the innovation is coming from software. That's the proclamation of William Gates, founder, chairman and executive vice president of Microsoft Corp., Bellevue, Wash., one of the leading developers of software for personal computers.

He explains: "No longer do we (in the computer industry) need to go out and build better, more powerful hardware to achieve productivity improvements; we simply develop a new software program, and people can put it to use immediately in their existing machines. The revolution is here—and it is soft."

Gates' assessment may underestimate the hardware segment of the industry. While it is true that advances in software have played a major role in bringing computers down to the personal level, technological advances in hardware have played a leading part, as well.

But his emphasis on software is entirely correct in at least one sense. VisiCorp's introduction of VisiCalc, the first electronic spreadsheet, in 1979 has been credited with selling thousands of Apple computers, a claim that Apple does not dispute. Until that time, most Apples had been used in technical markets. VisiCalc gave the computers a more widespread appeal and helped push Apples and other personal computers into the general market.

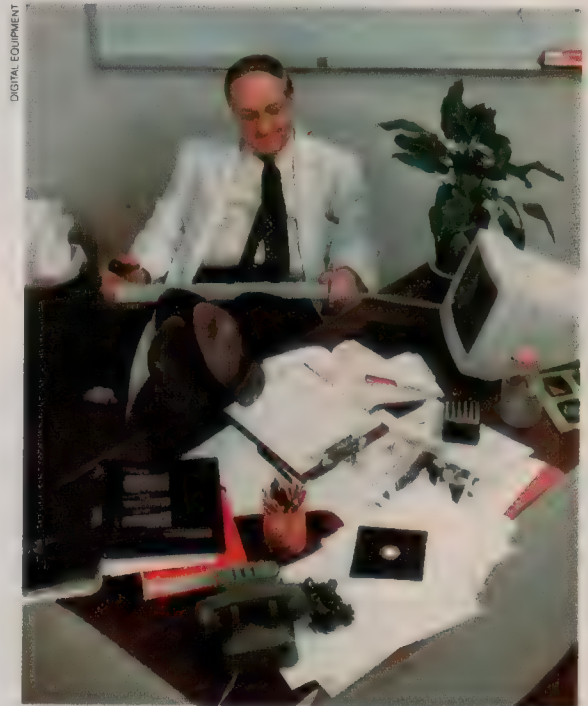
Computers can perform a myriad of tasks. Their applications are numbered in the thousands. But it's the software that makes computers run.

Personal computer software traditionally has been classified in two broad categories: system software and application software. System software includes operating systems and languages (see further information following). Application software, which is described below, works with system software and is developed to perform a specific application, such as writing payroll checks or writing "the great American novel."



APPLICATION SOFTWARE: WORD PROCESSING

Word processing, a computer's version of writing anything from notes to novels, is the biggest single use for personal computers. That's true, says Future Computing, Inc., the Richardson, Texas market research firm, regardless whether a computer is used strictly at home or both at home and at work. A recent Future Computing survey found 64 percent of all personal computer owners use their machines primarily for word processing. Chances are good, then, that this is where you will start your software shopping.



Gone are the days when the right software was hard to come by. Today, a wealth of software programming is available for almost any need.

Word processing programs are designed to run your computer much like a traditional typewriter, but with several added features. Unlike typewriters, computers with word processing separate the writing and editing of documents from the printing. On a word processor, mistakes can be corrected, sentences can be rewritten, entire paragraphs can be rearranged or repositioned before the final version is printed.

Because of those features, word processing software is extremely popular among writers, attorneys and other professionals who do a great



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- Kaypro**—The Complete Business Computer for \$1,595.
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- Lanier Business Products, Inc. Electronic Office Systems Division**—To feel the full force of the Lanier Business Processor in a personal demo.
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- Lotus Development.**
- Peachtree Software, Inc.**—The single source for packaged microcomputer software.
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- PFS Software, Software Publishing Corporation**—Free Catalog.
- MultiMate**—For more information on professional word processing.
- Radio Shack TRS-80®**—Computer catalog features the latest TRS-80 products—computers for home and business.
- Texas Instruments 99-4A**—Latest hardware and software brochures available free.
- Toshiba America, Inc.**—Information Systems Division.
- Verbatim Corporation**—Verbatim Datalife Flexible Disk. Guaranteed Five Year Warranty.
- WICO**—Joysticks—Trackballs—Mouse Units Interface Cards and accessories.

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17. **Toshiba America, Inc.**—Information Systems Division.
18. **Verbatim Corporation**—Verbatim Datalife Flexible Disk. Guaranteed Five Year Warranty.
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deal of writing. With attorneys, for example, standard legal forms can be written into the computer, stored in its memory and then printed when needed. Separate contracts do not have to be individually typed each time they are needed. Documents also can be customized before printing by entering a client's name and address.

Related but separate programs further enhance word processing. After writing a lengthy letter, a user could run a proofreading program to check for spelling errors. Most personal computer "dictionaries" contain 30,000 to 50,000 words and will compare each word in a document to that dictionary. The computer will highlight each word on the screen that it doesn't recognize. Then it's up to the user to check each

of names and addresses from a separate program and merge them with a letter. In that way, you can personalize form letters much like mass-mail advertisers do.



FINANCIAL SOFTWARE

Financial software is a broad category that includes programs to handle everything from home budgets to complicated business spreadsheets.

Like word processing, financial management software separates the entry and calculation of information from the printing of final forms. For instance, if your family has budgeted a certain amount for health insurance, a rate change can be entered simply and the computer makes the necessary adjustments to the overall budget.

Other financial programs will help you calculate mortgages and depreciation and determine payment schedules and amounts for home or car purchases. Others can help you balance your checkbook or prepare your tax returns. Just enter the information and the computer will handle the calculations.

Spreadsheets and other financial programs are used extensively by accountants and businesses. Standard programs are available to handle accounts payable, accounts receivable, general ledger and payroll. Financial analysis and forecasting packages also are popular, and such programs can help you at work or at home.

RECORD KEEPING

Storing lists of information in your personal computer is called data base management. Companies of all sizes use data bases to keep track of their production records, customer orders, schedules and inventory. On a small level, similar lists of information can help you at home.

Mailing lists, Christmas and birthday card lists, recipes, telephone directories and appointment calendars are common home uses for data bases. Another would be for a child to keep school notes listed in a data base rather than on index cards. In any such listing, users can identify key words. Then, when you are looking for particular information in the data base, the computer searches for those key words and displays the entries on the screen.



Games software can introduce your child to the personal computer. Educational software designed as games teach children while they play.

word to see if there were a spelling error or if the word were proper but just not included in the dictionary.

An average magazine page contains about 1,000 words. A proofreading program would take approximately 30 seconds to check every word; it should take the user, assuming average typing ability, a minute or two to check and correct the highlighted words.

Other special programs include a thesaurus to help you find synonyms, a grammar checker and a mail list merger. The merger can take a list



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Because if he stumbles
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With TI's unique step-by-step teaching system, your child can get a head start in school that could last a lifetime.

Somewhere in every child's life, there's a subject that throws him. Where he was once even with all the other kids, maybe even a little ahead, he's now beginning to fall behind.

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If you want to find everyone you know who has a birthday in June, scan all your favorite recipes for ham or check your school notes for any information on George Washington, the computer will do it for you.

COMMUNICATION SOFTWARE

Communication software can put you in touch with friends who also have personal computers, with the main computer in your office or with any of a number of computerized information sources. As with CB radios of the 1970s, many people now are buying personal computers so they can "talk" with other personal computers.

Tapping information sources is one of the major advantages of communication software. Some of the better known services are CompuServe, the Source, Dow Jones and Dialog.

CompuServe provides access to current news stories from major newspapers and maga-

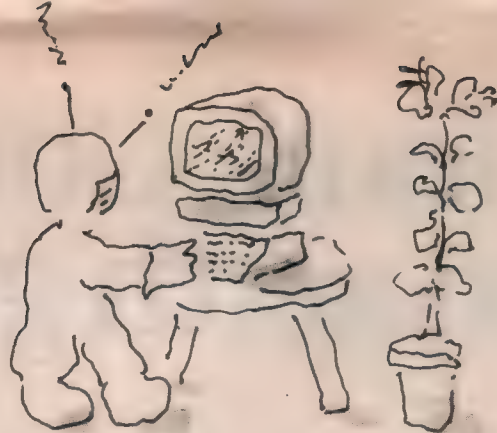


Getting started with your personal computer is easy. Just plug in the software by hand, and your machine is ready to work for you.

zines across the country. The Source offers up-to-the-minute stories off the United Press International news wires. The Dow Jones service not only gives current stocks and bonds information, but also stories from recent issues of the *Wall Street Journal*. Dialog is more like a research library, providing abstracts from magazines, newspapers and other resources on a wide range of subjects.

GRAPHICS SOFTWARE

Graphics, a personal computer application that's rapidly gaining in popularity, according to



Future Computing, lets you draw and design things.

Graphics can help you make sense out of rows and rows of numbers, for instance. Your family budget may be lined up neatly in a spreadsheet program, but graphics software can give you an instant picture of what those numbers represent.

As with spreadsheets, the graphics change as you change or adjust the information. If you want to see what impact the purchase of a car will have on your savings account, a pie chart, bar chart or linear graph can show you before and after differences.

EDUCATIONAL SOFTWARE

Your child can learn almost anything that is taught in school on a computer. Mathematic and spelling programs replace the flashcard method of learning simple words or math tables. Many have been designed as games for young children, but the end result is that they learn as they play.

More advanced programs in such subjects as algebra, calculus and geography also are available. Such programs are referred to as "interactive" because the computer responds to your answers, telling you if you are right or wrong, giving you hints or prompting you in the right direction.

Other programs can help you learn how to operate your personal computer or how to get the most use out of another software program.

ENTERTAINMENT SOFTWARE

Entertainment software—games—also has played a major role in spawning the popularity of personal and home computers. Virtually any electronic arcade game is also available in a software program for your personal computer. Pac-Man, Frogger and Space Invaders are three of the most well known, but they are only three of the thousands of available games.

Most software games are aimed at children, but more advanced challenge games are also being developed for adults. Many of these are,

SOFTWARE AT A GLANCE

WORD PROCESSING

This, the largest single use of personal computers, lets you write anything from memos to novels, but with several advantages over using a typewriter. With word processing, you can correct mistakes, rewrite sentences, rearrange paragraphs—all before the text is printed. Prices for word processing programs range from about \$50 to more than \$500. As with all software, don't be afraid to try a less expensive program. It could include all the features you require.

FINANCIAL SOFTWARE

Software packages in this category help you accomplish a variety of tasks from managing your household budget to preparing your tax returns. A key advantage is that financial software recalculates your total budget if you have to change a single entry.

RECORD KEEPING

Record keeping software helps you keep track of lists of information from phone numbers to appointments. Record files can be quickly searched for desired information by using "key words." For example, using the key word June, you could find the names of all your friends and relatives who have birthdays or anniversaries in that month.

COMMUNICATION

Communication software lets you send messages to other computers or receive information from a variety of sources. Data services offer everything from up-to-the-minute stock quotations to general reference li-

braries. For a fee (plus any long-distance telephone bills), you can access information from services such as The Source, CompuServe, Dialog and Dow Jones.

GRAPHICS

Graphics software can translate rows of numbers into pie charts or bar graphs, giving you a quick pictorial representation of what those numbers mean. As with financial software, graphics programs can recalculate the overall picture if you update a single entry.

EDUCATIONAL PROGRAMS

Educational software, designed to be used in the home or at school, can help a young child learn spelling, an older child learn algebra or calculus or help you learn a foreign language. This is one of the fastest growing segments of the software industry, and new and expanded programs are being introduced almost daily.

ENTERTAINMENT

Virtually any game you and your child enjoy at the arcade is available for your home computer, as well. Literally thousands of other entertainment programs are available, too, ranging from complex maze and challenge games to popular titles such as Scrabble and chess.

INTEGRATED PROGRAMS

This is a relatively new category of software that lets different types of programs work together. If an integrated package includes, say, word processing and graphics, you could combine both text and charts on one presentation.

like educational software, interactive. The computer responds and makes its move based on your decisions. Popular games such as Scrabble and chess also await you.

INTEGRATED SOFTWARE

Integration is a relatively new word in the vocabulary of software. It refers to different types of programs that are designed to work together.

Some new programs, such as Lotus Development Corp.'s 1-2-3 program, combine three to five programs into one. The three components of 1-2-3 are financial modeling, graphics and data base management. With similar programs, a user could produce a document that includes a combination of text, tables of numbers and graphic charts.

"The idea of using integrated applications is really important," says Robert Freeman, a senior researcher with Input, a Mountain View, Calif. market research firm. "It becomes a real pain in

the neck to re-key all the information if you want to do four different things with the same data." Integrated software helps relieve that pain.

Most integrated programs are also interactive. That means if you are working in one program and change some information there, the computer will automatically update the same information where it appears in the other programs.

Two companies—VisiCorp and Quarterdeck Software, a new software developer in Santa Monica, Calif.—have added a new twist to integration. They are not producing integrated software, but integrated operating systems.

VisiCorp's VisiON and Quarterdeck's DesQ, both expected to be on sale this fall, are designed to let users pick any combination of software programs from any companies and run them together. Company officials say that in this way, consumers can tailor integrated programs to suit their particular needs.

United Software Co., Wichita, Kan., has still



another twist. It offers six different programs that are sold separately. Each program can operate separately, or can be integrated with any combination of the other programs.

SOFTWARE THAT'S READY TO GO

You don't have to know the first thing about programming to run your personal computer productively. You don't have to hire a professional programmer to help you, either.

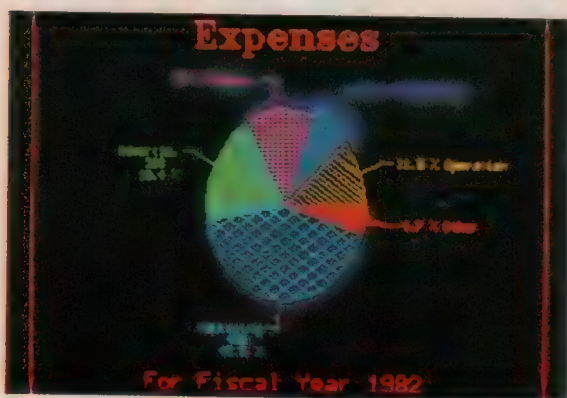
Virtually any software that a first-time computer user would need is available "off-the-shelf and is ready to go to work," says George Morrow, founder and president of Morrow Designs, San Leandro, Calif. Don't try to get too fancy too early with custom software, he advises.

Further, industry experts suggest that you need not commit yourself to high-priced, fancy

program called Planner Calc by ComServe as an example. He rates Planner Calc as a very good spreadsheet program that was originally in a cellophane-wrapped hang card with a bold red and white target design on the package. People didn't buy it, he says, "even though it was more sophisticated than many of the other spreadsheet programs selling for a lot more money." The problem, he says was that the package looked "like you would use it to play 'Bowsmen and Archers.'" The company eventually doubled the price and put the program in a new package. Sales improved dramatically.

So, don't be afraid to try out a less expensive program. It could turn out to be a good program that's adequate for your needs. In fact, experts say, test any program before you buy it. Ask for a demonstration and read the documentation (user's manual and directions).

Some software companies, such as Lotus Development Corp., Cambridge, Mass., provide



The personal computer can make information more understandable. Graphics displays are simple yet memorable.

packaging. There are many software programs in the \$50 to \$100 price range in plain packages that can perform as well as fancy packages costing \$300 to \$500.

Here's the view of Robert Freeman, a senior researcher with Input, a Mountain View, Calif. research firm serving the personal computer industry: "There are about 15,000 software products on the market right now. Given the amount of shelf space in the average computer store, perhaps 100 can be accommodated. And out of that 100, there are usually about 15 that the salespeople can really demonstrate well. An alternative to being one of those 15 is to grab the shopper's attention with packaging."

Freeman also feels that many software shoppers equate low price with an inferior product. That's not necessarily so, he says, citing a pro-



The most popular type of software is word processing. With it, you can edit, correct or replace words, format or footnote, quickly and easily.

gram called Planner Calc by ComServe as an example. He rates Planner Calc as a very good spreadsheet program that was originally in a cellophane-wrapped hang card with a bold red and white target design on the package. People didn't buy it, he says, "even though it was more sophisticated than many of the other spreadsheet programs selling for a lot more money." The problem, he says was that the package looked "like you would use it to play 'Bowsmen and Archers.'" The company eventually doubled the price and put the program in a new package. Sales improved dramatically.

Other companies are trying a new format that allows users access to only a small portion of the program, but enough to test it at home on their own computer. If a customer is satisfied, he can return it to the store, where a special decoding technique "unlocks" the full program for the user when he pays.

"With software especially, I think the most important thing is to make sure that the people you are buying from are reputable and will support and stand behind the product," says Ed Juge, director of merchandising for Tandy Corp.'s Radio Shack Division, Fort Worth, Texas.

The first software that's truly compatible with the ultimate personal computer.



Every software ad you read seems to be talking about 'integrated software'. But it was 1-2-3™ from Lotus® that actually gave the phrase real meaning, because we combined spreadsheet, information management and graphic functions in one simple, powerful program.

A program that is faster and easier to use than any other software available today.

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Because we feel the real criterion for any management tool is its ability to let the human mind flourish and

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That's why with 1-2-3 the thought process is not interrupted, so your mind no longer has to wait for your hands. To the novice, it makes everything plausible. To the expert, it makes anything possible.

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SYSTEM SOFTWARE

System software, also called the operating system, is the software that governs the internal workings of a computer and allows the computer to operate application programs. It's not necessary for a personal computer user to know the technicalities of operating systems, but you should be aware of the different types because the operating system determines the compatibility of application software.

The most common operating systems are Apple-DOS, TRS-DOS, PC-DOS, MS-DOS and CP/M. Don't let the acronyms throw you. DOS simply stands for Disk Operating System. The preceding letters indicate what company developed the system or on whose computers the system runs.

Apple-DOS, of course, is the operating system for Apple computers. TRS-DOS runs Tandy Corp.'s Radio Shack computers. MS-DOS is a general operating system developed by Microsoft to run on a variety of personal computers. PC-DOS is IBM Corp.'s version of MS-DOS to operate its Personal Computer.

CP/M, the exception to the DOS alphabet, stands

for Control Program for Microcomputers. It is a trademark of Digital Research, Inc., a software company in Pacific Grove, Calif., that designed the system to operate, like MS-DOS, on a wide variety of personal computers. It is the most popular operating system not written for one brand of computer, although industry analysts say that MS-DOS, thanks largely to PC-DOS, is gaining favor among personal computer users.

Computer languages include such exotic names and acronyms as BASIC, Pascal, FORTH and so forth. Languages comprise the set of codes that computers understand to translate user's commands into action. (For more detailed definitions of each language, see the glossary of software terms.)

Languages are used to write application programs. You can buy a BASIC program, for instance, to develop your own custom application software, but that's probably better left until you have become more proficient in understanding and operating a personal computer. For now, thousands of pre-written application software programs are available.

But Juge admits that no matter how careful you are in your software shopping, there is always the chance that there will be a problem (bug) in the program. Further, he says, the problem could be in the computer itself. "The only way to be sure where the problem is (so you'll know where to turn for help or repair), is to take the software and run it on another computer."

In addition to checking the software itself, you should also be sure to read the warranty and

determine the amount of support you will get from either the store or the manufacturer. Most computer and software specialty stores will offer training sessions; most manufacturers offer free "hot lines" for assistance; and many stores and manufacturers will offer repair or replacement of damaged programs during the warranty period.

Some companies, such as Software Publishing Corp., Mountain View, Calif., offer complete 90-day warranties on their programs. Software Publishing warrants its PFS (Personal Filing System) "free from defects in material and workmanship, assuming normal use," and will replace defective programs for 90 days after purchase.

At the other end of the spectrum are companies such as Desktop Computer Software, Inc., Santa Cruz, Calif. It publishes its Graph'n'Calc financial modeler program with the proviso that the entire risk for quality and performance is with the buyer, who must pay for any repairs or corrections. President Michael D. Williams says that disclaimer is intended to prevent users from suing the company if business decisions based on the program's output go awry.

Try a local computer club or society for recommendations. Most have user groups of people interested in a particular computer or type of program. Members can prove to be an invaluable source of information.



IF YOU'RE CONFUSED ABOUT BUYING A PERSONAL COMPUTER, HERE'S SOME HELP.

With all the personal computers on the market, picking the one that's right for you can be pretty confusing.

Fortunately, there really is a way to simplify the whole process.

Here are a few ideas that'll help.

Computers come in two parts.

One is the "hardware," or the machinery itself. The other is the "software," or a program as it's sometimes called.

Software is the part that tells the computer what to do, the way the driver of a car tells it what to do.

Without software, a computer can't do anything. And vice versa. You have to buy both.

Buy the software first.

Since you're buying a computer to get the capability software gives you, pick out the software first.

Start with a list of things you want the computer to do. Anything from bookkeeping to beekeeping and everything in between; software is that varied.

Next, go to a computer store and ask a salesperson for a demonstration of the program—or programs—that will do the things you want.

The simpler the better.

Good software keeps the complications in the computer, where they belong. And keeps the capability at your fingertips. So look for software that's easy to learn and easy to use.

You simply have to see for yourself.

Information is helpful, but there really is no substitute for a real, live demonstration.

When you do go out shopping, we recommend you also take a look at the PFS® Family of Software.

The PFS family is designed the way we think all software should be: simple, straightforward and powerful.

Currently, four products make up the family, PFS:WRITE, PFS:FILE, PFS:REPORT and PFS:GRAPH, with more programs on the way.

PFS:WRITE. Makes your writing time more productive.

With WRITE, you just start typing. Then you can correct misspellings or substitute one portion of text for another, with just a few keystrokes.

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WRITE also works with most popular software programs, including the PFS Family of Software. This allows you to generate form letters. Or combine columns of numbers or graphs with your text.

PFS:FILE: The Simplest way to get organized.

With FILE, you can record, file, retrieve and review information in a fraction of the time it takes with a conventional filing system.

FILE lets you arrange your information in "forms" you design yourself. So you can use your information in ways never before possible.

PFS:REPORT. Makes the most of your information.

PFS:REPORT summarizes the information on your forms so you

can use it to analyze, plan and make better informed decisions.

With REPORT, you get presentation quality reports, sorted, calculated, formatted and printed, automatically, in seconds.

PFS:GRAPH. Instant pictures.

GRAPH gives you presentation quality bar charts, line graphs and pie charts, in black and white or color, on paper or the computer screen. To get a clearer picture of things and spot trends instantly, you simply enter your information and specify the kind of graph or chart you want. GRAPH does the rest.

It also works with PFS:WRITE, PFS:FILE, VisiCalc® files or data entered directly into the computer.

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A GLOSSARY OF SOFTWARE TERMS

Application Software—Programs designed to carry out specific tasks; i.e., word processing or database management, as opposed to controlling the operation of the computer system.

Assembly Language—A low-level computer language, written in what might be described as a type of mnemonic code. Although less difficult than machine languages, which require that all commands be phrased in binary code, it is still much more cumbersome to use than the higher level programming languages.

Back-up—The vital procedure of copying all important program files onto a spare disk for separate storage.

BASIC—Beginner's All-purpose Symbolic Instruction Code, a high-level Computer language that uses English-like phrases as program commands (load, save, print, run, etc.).

Bug—An error in either the syntax or logic of a software program, resulting in impaired function. The process of detecting, diagnosing and correcting such an error is referred to as Debugging.

CMS—Short form for Conversational Monitoring System, which is an operating system that gives users in a terminal network the effect of operating a personal computer.

COBOL—Stands for Common Business-Oriented Language, a programming language developed in the 1950s and still a predominant choice for data processing programmers. More difficult than BASIC, it could still be described as English-like in syntax.

Code—The set of instructions that make up a program.

Command—An instruction that signals the computer to begin, end or continue a specific operation. Commands are directives initiated by the user with keyboard buttons or portions of words.

CP/M—A registered trademark of Digital Research Corp. CP/M stands for Control Program for Microprocessors, a popular operating system for small computers. Its commands are used to track data and programs stored on disks and to determine the programming language.

Database—A store of data on files accessible to a computer through an information retrieval system.

Database Management—A software package designed to assist users with varying needs to access and use a database. In addition to locating particular items within the files, the program must be capable of effecting additions or changes in the information stored.

Data Processing—A general term that encompasses all clerical, arithmetical and logical operations that can be performed upon data by using a computer.

Directory—A listing of all the files stored on a disk, usually according to name, size and type.



Driver—In the most general sense, a small program designed to execute other programs. A particular meaning, however, is software for a computer typesetter that intersperses commands about code structure and proper format into the text.

Documentation—Explanatory materials accompanying a computer program. Usually refers to a manual, but may also mean tutorial disks or clarifying comments inserted into the program in a form that can be seen by the user but still be ignored by the computer. Documentation usually includes program specifications, operating instructions, listing of variable names within a program, sample problems and representations of screen content at various points in the program.

DOS—Abbreviation for Disk Operating System.

Editor—A word processing software package that can be used to generate programs as well as text; it also allows for the manipulation of data in memory.

Emulator—Software that allows one system to imitate another, dissimilar

system to the point of being able to accept the same programs and achieve the same end results. An emulator program would allow a word processor to act as a telex, for example, or permit software designed for larger machines to run on a personal computer.

Encryption—Coding of data to prevent unauthorized access.

File—A collection of data sets that are organized and stored as a unit. Files, which are stored on disk or tape, are used to read and write information in an orderly fashion.

FORTRAN—Stands for Formula Translation, a scientific programming language developed during the 1950s primarily to solve scientific and engineering problems.

Global Search and Replace—An editing function in word processing software that allows the user to specify a word or phrase and its desired replacement; the program will search the text for every appearance and automatically make the substitution.

Glossary Function—A feature of word processing software that enables the user to store certain commonly used phrases in storage for insertion at any point, upon execution of the glossary command.

Integrated Software—Software that combines several related application programs within a single package, making it possible to easily merge information from separate files.

Machine Language—A language written so that a computer is able to execute its instructions without further interpretation. Statements are composed in binary code and arranged so that each statement corresponds to one machine action.

Mask—A list of options or action choices presented to the user of an application program via screen display. A program may contain one or several masks; the trend is to use them as a means for relieving the user of the burden of learning function commands.



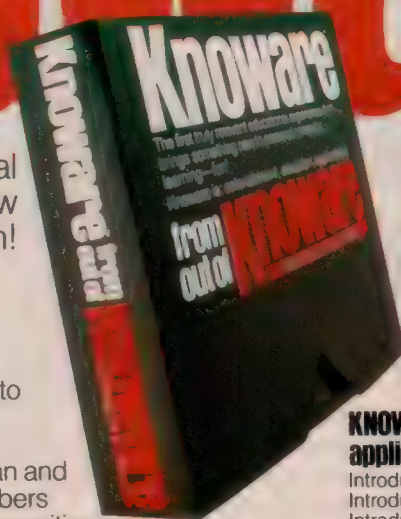
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Port—A point of access or electrical connection to a system or circuit; the sockets used to connect peripherals to the main computer unit.

Printer—A typewriter-like output device that converts electronic signals into print on paper.

PROM—Programmable Read-Only Memory; an internal computer memory that can be programmed once, but not re-programmed (as in EPROM).

RAM—An acronym for Random Access Memory. RAM provides quick access to any storage location point because it allows for searches that scan vertically and horizontally, instead of sequentially. Both computer internal memories and disk memories are RAM devices, while tape is a sequential storage device.

ROM—Read-Only Memory; the area of memory that cannot be altered by the user. Contains the firmware placed in memory at the point of manufacture.

Screen Dump—The process of sending instruction signals to a printer or plotter for the purpose of translating a screen image into hard-copy form.

Semiconductor—A substance—i.e., silicon—which conducts electricity only when the voltage across it exceeds a certain value. Semiconducting materials form the basis for diodes, transistors and integrated circuits.

Tape Drive—A device that converts information stored on magnetic tape into impulses that will be accepted by a computer.

Turnkey System—A complete and fully operational computer system dedicated to a single activity and requiring no knowledge of operating system commands.

Virtual Memory—Use of auxiliary storage in a manner that effectively makes it an inseparable adjunct to internal memory; continuous information swapping between the two storage devices insures that there is a seemingly unlimited amount of space in internal memory.

Wrap-Around—Describes what happens when information or imagery exceeds the display area on one side of the screen; as the image "bleeds" off the right side of the screen, it will simultaneously begin to appear on the left side, thus giving the impression of having wrapped around the back of the screen. This phenomenon is quite common when one is enlarging graphic images on screen.



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CHOOSING YOUR COMPUTER SYSTEM



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best buy?

To start with, the first-time shopper should realize that he is not buying a computer, but a computer system. A system includes a keyboard for entering data, a terminal for viewing information, a microprocessor that manipulates data, a printer and the wires, cables and plugs to connect all the parts.

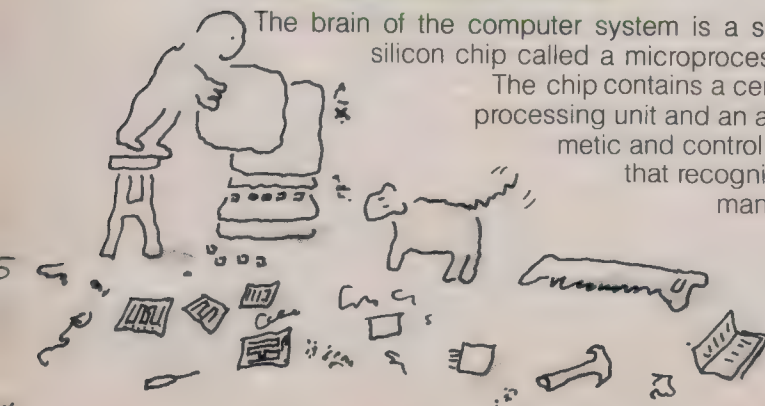
Systems are sold in various configurations. All include the microprocessor; many have keyboards; most are equipped with terminals; few come with printers. Often, advertisements leave the buyer with the impression that he will receive a complete system, but this is seldom the case. A complete computing system will probably double the cost of the machine advertised.

What causes this discrepancy? David Kay, vice president of the Kaypro Division of Non-Linear Systems, Inc., Solana Beach, Calif., says: "At recent trade shows, I found several companies offering professional computers for less than \$1,800. When I questioned their personnel, I found that several of the necessary components, including display screens and second drives, were extra-cost add-ons. I also found several of the producers of home or toy computers trying to represent their products as full-function professional computers—which, of course, they are not. There is already enough confusion in this industry and among potential purchases. I feel it is a disservice to add to this confusion."

WHAT MAKES A COMPUTER TICK?

The brain of the computer system is a small silicon chip called a microprocessor.

The chip contains a central processing unit and an arithmetic and control unit that recognizes, manipu-



lates and changes electronic currents. Each chip fits inside a container that measures only 28-thousandths of an inch square and could easily fit beneath a fingernail. These chips control computerized stoves, "talking" automobiles and self-starting coffee pots.

Chips cost only a few dollars. If people understood electronic current, chips could function as computer systems, but accessories are needed to translate information into currents that the microprocessor can manipulate. And vice versa. While some people find dabbling in the world of electronic currents stimulating, most people find it frightening. This supplement is designed for most people, so it will explain only those component parts essential to determining which computer to buy.



Once you've selected your software programming, you can begin to examine the variety of options available for your personal computing system.

Chips for personal computers come in two sizes: 8-bit and 16-bit. The size refers to the length and the electrical currents that the chips can process. The difference between 8- and 16-bit computers is similar to the difference between 4- and 6-cylinder automobiles. A 16-bit computer is more powerful, has more flexibility and runs slightly faster than an 8-bit computer. Both run software written expressly for their particular lengths.

WHERE DOES THE SOFTWARE GO?

The information that the chip manipulates is software instructions and data used with software. Before information can be manipulated, it has to be loaded into the computer through the random access memory (RAM). RAM is measured in

increments of 1,024 characters, designated "K" (from the Greek Kilo, literally 1,000).

Each line of program or piece of data requires a certain amount of RAM. Personal computers come with as little as 2K and as much as 256K RAM. Information requiring 2K of space can be loaded into a computer with 256K, but it won't work the other way around.

RAM is erased when the machine is shut off, so users need a way to store information when the machine is not in use. The three most common options are cassette recorders, floppy disks and hard disks.

Standard cassette tape recorders can store programs and information for small computers. Programs and information can be written onto a blank cassette by a computer, and infor-



Personal computers are people-tested. Machines are designed to be not only easy to use, but comfortable as well.

mation on pre-recorded cassettes can be fed into the computer. Primarily, cassette tape recorders are used with small home computers.

Floppy-disk drives work more like eight-track tape players, although they look more like a flexible 45 rpm record in a cardboard sleeve. The drive's head reads information on a diskette placed in the drive. Most professional-level computers are equipped with at least one disk drive. Despite the extra cost, two drives may be preferable, so you can copy disks to the same backup in case the original disk is damaged.

Diskettes hold varying amounts of data. Some floppy disks store 100,000 characters (about 100K bytes), which translates to 80 typed pages. Other floppy disks are double density, meaning that they store twice as much data—160 pages—as single-density disks. Early disk drives read only one side of the diskette; now

they can read data on both sides for a maximum capacity of 320 typed pages.

The **hard-disk drive** is becoming a popular storage medium, because it stores much more data and retrieves data much more quickly than a floppy-disk drive. But it also costs much more. Hard-disk drive prices average \$2,500, while floppy-disk drives sell for around \$500.

Hard-disk drives work in much the same way that floppy-disk drives do, but they use specially treated aluminum disks to record information. A disk stores between 5 million and 40 million characters (bytes), or from 4,000 to 30,000 typed pages of information. Hard-disk storage generally is described in megabytes (from the Greek mega, meaning a million). So, 5 million would be referred to as 5 megabytes or, often, just 5M.

All types of drives, as well as terminals, printers, televisions and other peripheral equipment, are connected to the computer through input-output (I/O) ports. Ports are outlets in the back of the computer that accept certain cables and plugs. There are two types of standard plugs: serial and parallel.

Ports differ in the manner in which they receive data—just as stereo systems have different connections for tape recorders, microphones and turntables. However, there is no standard for compatibility, and different types of serial and parallel ports are supplied. When buying a peripheral device for your system, make sure it matches your computer and software requirements. Often, users take the machine home before realizing that the terminal can't be plugged in or the printer can't print what is on the screen. Whenever possible, have the person who sells you the equipment test the connections first.

TERMINAL COMFORT

Terminals are the television-like monitors that display the work you are doing on the computer. Most home computers that sell for less than \$500 do not have a terminal, but they do have a device that hooks the computer to a television and transforms the set into a terminal.

Most, but not all, professional-level computers do come with a terminal. Terminal screen sizes range from 3 to 14 inches (diagonal) and offer monochrome combinations of black and green, amber, pink or white displays. Within the terminal, character display capacities vary from 40 horizontal lines with 80 vertical columns to two lines with 40 columns.

TAKE YOUR COMPUTER HOME

In 1981, the first portable computer was introduced—a computer that could be easily packed and carried. A myriad of uses emerged. Today, office workers share portable computers; portables are stored beneath airplane seats; businessmen carry them to sales calls, press conferences or construction sites; and, when the mood strikes or the boss screams, work is taken home.

Because of these uses, portables represent the fastest growing segment in the personal computer industry. A Venture Development Corp. report says sales of portable computers will grow to \$4 billion in 1987, up from about \$500 million this year. "By 1985, portables will outsell desktop computers by a three to one margin," claims David Kay, vice president of the Kaypro Division of Non-Linear Systems, Inc., Solana Beach, Calif., a manufacturer of portable computers.

What constitutes a portable? That's a simple question without a simple answer, because portables embody trade-offs in computer design. These include size of the screen vs. bulk of the machine, capability

vs. weight, ease of use vs. ease of transporting. Portables possess various shapes, sizes, prices and capabilities.

Size and weight trade-offs fall into two classes: computers weighing approximately 30 pounds and transported as easily as suitcases; portables weighing approximately 10 pounds and carried like briefcases.

Capabilities are not classified as easily. Screen size ranges from 2 lines with 40 columns to 40 lines with 80 columns. RAM fluctuates between 8K and 256K. Printers are included with certain portables; telephone jack modems with others. Batteries power some computers for three hours; others need to be plugged in.

Before buying a portable, a buyer should answer a series of questions. Does it have sufficient RAM to run my software? Do I want a modem? Will I need a printer? Is the screen large enough? Can it operate with batteries? If so, for how long? Is it easy to carry? Is it compatible with my company's computer? Do I really want to bring my work home?

If you purchase a terminal separately from the computer, check these factors first:

—Is the screen large enough to adequately display the type of information you will be working with? If you plan to do lengthy word processing or complicated spreadsheets, you'll probably want a screen with a full 80 columns and at least 24 lines. If you plan to use simpler programs, such as filing notes and working on home finances, a smaller screen should be sufficient.

—Check the display color combinations to see which you prefer and find most comfortable for your eyes.

—Make sure the terminal will work with your computer. If possible, bring your computer into the store and ask the retailer to hook it up to test the compatibility.

BUT I CAN'T TYPE

Mother always told you to go to typing class. But typing class, piano lessons and liver terrified you as a child. Now, typing may threaten you as an adult. While gatekeepers of the information age sit staring at you with a keyboard, your mother's voice echoes, "I told you."

You are not alone. Manufacturers realize that a lack of typing skills prevents many people from using computers, so they are developing devices that limit the need for typing skills.

The most widely known is the joystick, a hand-held device with a control stick and one or two pushbuttons. Commonly, the device is used to ward off alien invaders and control Pac-Man as he devours power pills.

The "mouse," another hand-held device, transposes movements on a flat surface onto the computer screen. A mouse features one to four buttons and a long "tail" (cord) that connects to the computer. Although a mouse can function as a game control, it is used primarily as a push button command for editing in word processing and spreadsheet applications or as a "brush" with graphics software.



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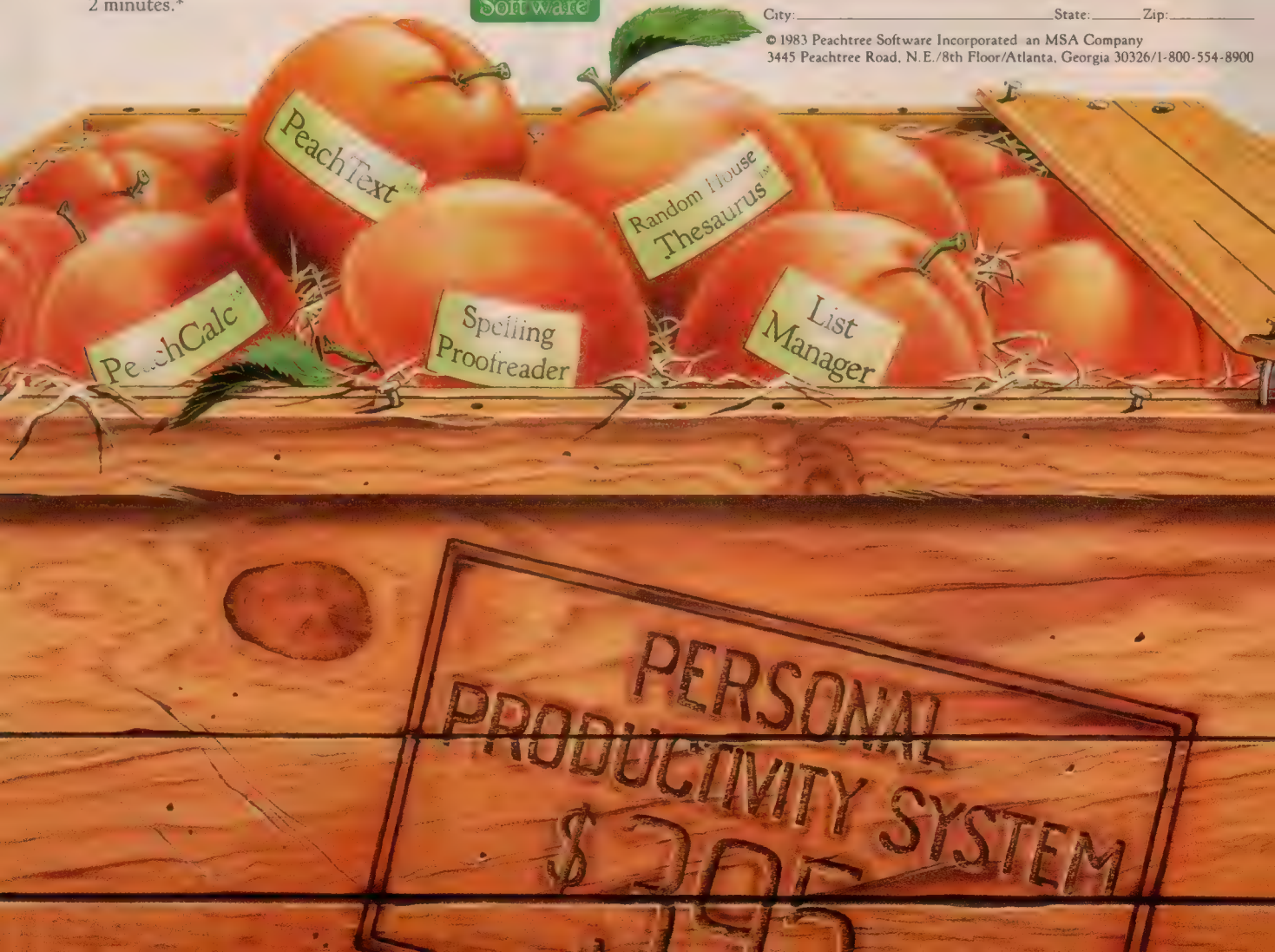
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Touch-tone screens eliminate some use of a keyboard. By touching a finger to the screen, a user can select functions. The screens are not very useful for word processing or other complicated functions, but can be used for simpler functions such as selecting options in an operation.

Special pens also can work with touch screens. Touch-tone pens enable a user to enter information by touching the screen with the pen. Other pens can transfer characters written on a special surface onto the screen.

ERGONOMICS SOUNDS AWFUL. BUT LOOKS LOVELY

Ergonomical design should help the first-time buyer welcome automation. It means that the computer looks nice and works well. But the word ergonomic sounds awful; it conjures up images of widgets, electronic currents and technicalities that the computer rookie fears. Only the computer industry could take pretty and make it sound technical.

While manufacturers aren't completely ready to abandon computerese, they understand that novices are intimidated by it. Manufacturers as well as first-time buyers are concerned about how the machine looks and feels. "How well does the computer work with the person?" asks Mike Sheperis, a vice president at Gusdorf Corp., St. Louis, Mo. which makes computer furniture. "Can the operator sit at the machine comfortably for hours?"

So, computers are being tailored to meet the user's needs rather than vice versa. Terminals come with characters in amber and pink rather than green. Some terminals are equipped with more than one color so fields can be highlighted. Other terminals tilt up for a tall user and down for the small person. On keyboards, "insert" and "help" keys are replacing "PF1" and "PF13" keys.

When you bring a well-designed computer home, you probably won't display it on the dining room table, but it still has to blend into your home. "Computer furniture must be compatible with other styles of furnishings and colors and satisfy individual tastes and predilections," says Sheperis.

Proper computer furniture helps you adjust to the computer. It raises the terminal to eye level, places the keyboard at typing level, easily feeds paper and silences printer noise.

When terms like ergonomics are banished, computers will look pretty, work well—and sound pleasant.

MODEMS PUT YOU IN TOUCH

With a modem, computers can phone home. A modem transforms a lonely, single computer with no one to talk to into a machine with a worldwide network of compatriots. A modem uses telephone line to "talk" to other computers, sending and receiving information.

There are two types of modems: acoustic couplers and telephone jacks. An acoustic coupler is a device with two suction cups. The user dials the number, then places the telephone handset in the suction cups. Acoustic-coupler modems fit any phone, but they easily pick up any static in the telephone lines. Static can produce garbled images instead of characters on the receiver's screen.

Telephone-jack modems allow a cable from the computer to be plugged directly into a telephone outlet. The user enters the phone number from the keyboard. Telephone-jack modems have clearer transmissions than acoustic coupler modems.

Modems transmit information at speeds



measured in baud rates. A modem with a 300-baud rate sends data at a rate of 30 characters per second, which is considered sufficient for home use. Slower, less expensive modems are also available, as are more expensive models with transmission rates exceeding 19,000 baud.

Certain modems make telephone dialing and answering easier. Features include automatic dialing of a busy number until it is free, automatic answering, dialing a second number if the first is busy, and single-keystroke dialing of stored numbers.

Not all computers can use modems; some require special cables. The best way to ensure that your computer has the proper equipment is to bring it to a computer store where the proper parts can be attached. Cables and communication software will raise your modem's price from the \$100 to \$300 range to \$400 to \$600.

A modem gives you a variety of communication opportunities with your personal computer. With compatible equipment, you can send information to or receive information from the main computer in your office. If your friends or busi-

ness associates have personal computers equipped with modems, you can send and receive messages ("electronic mail") from them.

A number of companies also maintain huge databases of information that you can, for a fee, access via your modem. Of course, you also have to pay the phone bill. Available information ranges from up-to-the-minute stock market quotations and the day's news to general libraries of data in which you can get information much like using an encyclopedia. Your local computer store has information on a variety of these sources.

SLOTWARE: A NEW TERM FOR MORE POWER

As you become more familiar with your computer system, you will begin to find more uses for it. Your computer may lack sufficient RAM, the right printer or the features necessary to fulfill those new uses.

But to reach your goals, you don't necessarily have to buy a new system. Slots inside your computer can be filled with processor boards or "cards" that can expand memory capacity, communication capability and other internal processes.

"Inexpensive computers are an excellent way to get started in the world of computing without initially incurring too much expense," explains Winn Schwartau, marketing director for Microtek, Inc., a San Diego company that makes such cards and trademarked the term Slotware. "But there is a sacrifice. To make the computer do what you really want eventually, you are going to have to expand your computer's facilities ... unless you buy a more expensive computer."

Schwartau lists some examples. If your computer doesn't have enough memory to handle, say, a large spreadsheet program, add-on RAM cards are available in capacities ranging from 16K to 1M bytes. If your printer can't print graphics, a high-resolution graphics printer card can give it that capability.

Or, if you have to wait too long to use your computer while your printer is printing, a printer buffer card can be the answer. A buffer card allows you to quickly "dump" the information you want to print into the buffer. Then, as your printer works, your computer is free to do other work.

"Don't let the limitations of your first computer either inhibit your desires to make computing work for you or frustrate your efforts to become proficient," Schwartau says.



4

COMPUTER SYSTEMS: YOU GET WHAT YOU PAY FOR

PRICE RANGE	WHAT IT BUYS
Less than \$1,000	For less than \$1,000, you can buy a computer that is geared primarily for home use. These computers have limited memory and printing capability. Most available software is in the home productivity and entertainment categories.
\$1,000 to \$2,000	Eight-bit computers predominate in this price range. Most computers here do not include the terminal or letter-quality printer needed to make them useful business systems, but there is a great deal of business software available. A vast selection of home productivity, entertainment and educational software is also available.
\$2,000 to \$3,000	Many professional-level computer systems fall into this price range. You can buy a system that includes a terminal, a near-letter-quality printer and two disk drives. Systems in this price range run not only a wide range of home software, they also can function as small-business systems.
\$3,000 to \$4,000	Systems in this price range usually incorporate newer 16-bit processors. These computers feature more memory and capabilities than do 8-bit systems, but not as much software is available as there is for the smaller computers. However, the software that is available is more advanced, ranging from sophisticated games to complex business programs.
\$4,000 to \$5,000	A \$5,000 system typically includes a hard disk drive, which is needed to run many of the most advanced software programs. Computers in this price range usually include all hardware features, from a color terminal to a letter-quality printer.

PRINTERS: YOUR LAST CHOICE

The last item the first-time buyer should consider is the printer. While this step may be a light at the end of the tunnel, that light could be an oncoming train if you're not careful. Printers can cost as much as the computer itself, and they pose many questions about compatibility and about how you plan to use one.

The three types of printers used most often with personal computers are thermals, dot-matrix and letter-quality (usually daisywheel) printers.

Thermal printers are the least expensive, using a copier-like mechanism to burn impressions into special thermal paper. Thermal printers' advantage is their price, but there are drawbacks, too. Once printed, the paper tends to fade over time, and the special paper represents an extra cost.

Dot-matrix printers move a little box of ink-jet needles to each character position on the paper. Minute drops of ink are shot from specified needles to form each letter. They print rapidly but produce letters that are broken up by tiny spaces. While sufficient for home use, they do not have the quality of electric typewriters.

"Microsoft® Multiplan™ allows me to explore more alternatives in less time. I think it leads to better management decisions."

Edward R. Schwinn, Jr.
President, Schwinn Bicycle Company

"Multiplan software helps me make better business decisions. It's as simple as that. With Multiplan on my microcomputer, I can explore a number of alternatives faster. That's really important to me in planning and tracking my totally hand-crafted Schwinn Paramount Bicycle. As with anything handmade, cost control and product planning are major considerations. For instance, Multiplan lets me study the

effect of the learning curve on overall productivity. And although we have a mainframe computer, I find that Multiplan is a tool that allows me to personally examine my business options—without spinning my wheels."

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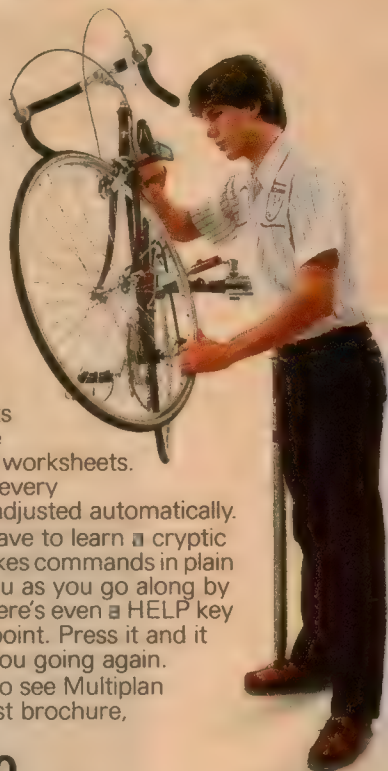
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Daisywheel printers use a wheel of spokes with a character on the end of each spoke. The wheel spins to the proper spot and a hammer presses the character to the ribbon, leaving a clear, crisp impression. Daisywheels produce the best quality print, but they are also the most expensive. Prices are falling, however, with some new models available in the \$500 to \$600 range.

A good rule of thumb is to decide first what your requirements are: Do I really need letter (typewriter) quality? Will I mail the letters to business people? How many hours a day or week will I be running the printer? Then check with your retailer to see what type of printer he recommends. Finally, compare his recommendation to price and print quality considerations.



You may not need to buy expensive extra equipment. Even some of the smallest personal computers are complete systems, with printers built in.

"If a user is going to run the printer only a couple of hours a week, an inexpensive printer is probably adequate," says Craig Willison, product marketing manager for printer maker Diablo Systems. "But if he starts to use this hobbyist machine as a true-life printer, he is going to fail with a typewriter-based mechanism." Willison contends that dot-matrix printers are more durable than daisywheels and will stand up better under frequent use.

Dot-matrix printers offer other advantages, too, says Howard Mueller, sales support manager for Anadex, Inc., a printer manufacturer in

Chatsworth, Calif. "They are excellent for graphics because they print with a greater resolution (clarity) than daisywheel printer," he says. They are also fast, printing about 130 characters per second. Daisywheels may offer the best clarity for letters (not graphics), but they are significantly slower, printing only 12 to 60 characters per second. Dot-matrix printers, meanwhile, range in price from \$600 to \$3,000.

One final suggestion from Ed Juge, director of merchandising for Tandy Corp.'s Radio Shack division in Fort Worth, Texas: "I would suggest that first-time computer buyers stick with all one brand of equipment as much as possible. Don't try to hang, say, a Radio Shack printer on an Apple computer with a Hayes modem. When you mix equipment and have a problem, everybody ends up pointing fingers at everyone else.

"There just isn't the degree of compatibility in computer equipment that you'll find in stereo equipment or the like," Juge says. "The first-time user can get in trouble trying to mix and match."

CHECK THE DOCUMENTATION

Finally, check your computer's instructions and make sure you understand them.

"Americans believe that written somewhere, probably in the Federalist Papers, is the inalienable right to own any device and have a set of instructions limited to two pages," claims James Finke, president of Internetwork, a new chain of computer stores based in Boston.

Some manufacturers believe this, too. So, unsuspecting users take their computer home and find a thin pamphlet filled with terms resembling Greek choral odes. Documentation, the written explanation of how your computer works, quickly becomes the leading factor in determining if you master or destroy your computer.

Companies are trying to help you master these machines. Recommendations from current users are being implemented to fine-tune operating instructions. Manuals are becoming easier to understand, more useful and more colorful. They are no longer written by engineers but by writers and are illustrated by artists.

Before you purchase a computer, look through the table of contents. Is it easy to follow? Think of a few problems and use the book to answer them. Was it easy to find an answer? Was the writing concise? Were there pictures and graphs to help you? If you answered these questions in the affirmative, you have already taken some steps toward mastering the machine.



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Access Time—The fetch-and-carry interval between entry of a command and retrieval of requested information from a storage device. Access to disk memory is measured in milliseconds, while internal electronic memory can be tapped in elapsed times that approach the nanosecond (one billionth of a second) level.

Acoustic Coupler—A device that facilitates long-distance communication between computers, connecting terminal to telephone receiver and transferring data back and forth by means of sound tones.

Adapter—A device that allows different parts of a microcomputer system to operate as a unit.

Artificial Intelligence—The performance by computers of functions usually associated with the human mind: reasoning, inference, intuitive problem-solving, learning, self-correction, language and pattern recognition. Also refers to the branch of computer science that is concerned with the production of these intelligent behaviors in machine structures.

ASCII—Acronym for American Standard Code for Information Interchange, an eight-bit binary code that translates keyboard symbols into computer-intelligible form, thereby allowing for the transfer of text. Most commercial terminals and printers use the ASCII code so that, when you type a letter (A) on the keyboard, the keystroke registers as a series of binary digits (0100 0001).

Baud—A unit of measure related to the speed of data transmission. One baud is equivalent to one bit per second; the higher the baud rate, the faster the exchange of information between the terminal and the computer.

Bit—A contraction of the words binary digit, which represents the smallest unit of information that a computer can hold. A bit is a single entry in binary

HARDWARE GLOSSARY

code (either zero or one) corresponding to the off/on status of an electronic switch or "gate." Computers can assess a multitude of switch positions in an instant, and such either/or combinations form the basis for all operations.

Breadboard—An experimental model of a program or piece of equipment. The term survives from a time when kitchen breadboards were used for temporary arrangements of electronic circuits.

Buffer—A device that is used to resolve differences between pieces of equipment, i.e., computer and printer, which operate at incompatible speeds.

Byte—A unit of information consisting of eight grouped bits (binary digits).

CAD—Acronym for Computer-Aided Design. CAD systems employ sophisticated computer graphics technology for applications that include printed circuit design, schematic design and parts engineering. Three-dimensional scale representations of products created on a CAD system are sometimes translated directly into physical form through the automatic transfer of programmed specifications to a second level of computer technology (known as Computer-Aided Manufacture or CAM) governing the operation of production equipment.

Cassette—A reel of magnetic tape enclosed in a plastic case and used to store musical recordings, voice information or the programs that run many small computers.

Chip—A very small slab of semiconductive material (usually silicon) housing an integrated computer circuit. A typical chip is 28-thousandths of an inch square.

Compatibility—The ability of equipment to interface without special adapters or other interceding devices.

Console—System part that allows a computer user to communicate with the central processing unit. It would usually include terminal and keyboard but may also encompass digitizing tablet for computer graphics or a direct contact device such as a mouse or a light pen.

Coupling—Verb referring to the process of connecting two systems in a way that allows them to communicate.

CPU—Acronym for Central Processing Unit, which is the heart of a computer system and the part where arithmetic and logical operations are performed.

Crash—A malfunction that causes the system to shut down without warning, often resulting in irretrievable loss of information. May be caused by software that has not been properly error-trapped or by chip or software damage resulting from electrical storms, power surges or static electricity.

CRT—Abbreviation of Cathode Ray Tube. Refers to a viewing screen that displays patterns formed by electron beam; i.e., television screens and computer terminal screens.

Cursor—A display symbol (block shape, caret, arrow, underscore, etc.) that automatically indicates character positioning but can be manually controlled for editing, formatting, character correction or the creation of computer graphics.

Daisy Wheel—A variety of impact printers that use a rotating type wheel to produce letter-quality text.

Disk—A magnetic computer memory device resembling a phonograph record, which stores computer data in concentric circles (tracks) on a surface that may be aluminum (hard disk) or plastic (floppy disk).

Disk Drive—Unit into which software is loaded and which information stored in this form is converted into signals that can be received by a computer.

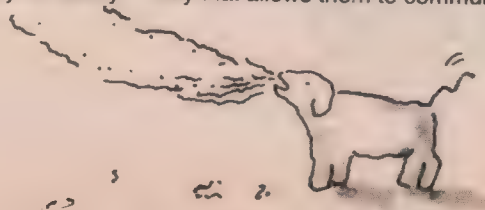
Dot-Matrix—A type of printer that uses needles, which strike the paper through a ribbon, to form characters from a pattern of dots. Low in cost, dot-matrix printers produce text that is readable but far below letter quality.


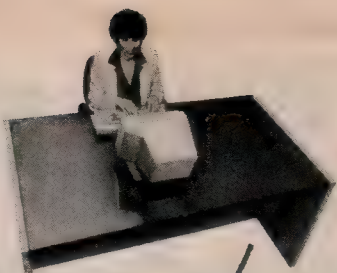

Double Density—Describes a disk with the same dimensions but twice the storage capacity of a standard disk.

Edit—The deletion, rearrangement or addition of information.

Electronic Mail—Digital transmission of messages from one location to another via computer-controlled data communication linkages.

EPROM—Acronym for Erasable Programmable Read-Only Memory; ROM chips that can be programmed to con-





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If you look at the printout below, you'll see a lot more examples of what we mean. And we think you'll realize why this is the most useable spreadsheet in the world.

Text can
"spill over" into
next column

Data management
capability

Calendar/Date
calculations

User-set decimal
places

Dictionary sort
order (not ASCII)

Floating
\$ signs

Negatives shown
in ()

Two key
sort

Individually
variable column
widths

Emp#	Name	Rate	Hours	Pay	Over	Net Pay	SS	Medi	Ret	Unempl	Unempl	Total	Unempl
1-1	Dawn Fuller	\$120	75	\$9,000	0	\$9,000	0	0	0	0	0	0	0
1-2	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
2-1	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
2-2	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
3-1	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
3-2	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-1	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-2	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-3	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
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4-69	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-70	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-71	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-72	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-73	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-74	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-75	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-76	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-77	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-78	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-79	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-80	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-81	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-82	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-83	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-84	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-85	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-86	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-87	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-88	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-89	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-90	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-91	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-92	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-93	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-94	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-95	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-96	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-97	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-98	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-99	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
4-100	John Doe	\$150	75	\$11,250	0	\$11,250	0	0	0	0	0	0	0
OFFICE TOTAL			80	\$91,182	1401	78	184,517	1569	75	884,744	1,318	77	8269,423
OFFICE SUMMARY STATISTICS:													
Lowest Utilization	55%	50%	56%	52%									
Highest Utilization	99%	99%	98%	98%									
Staff Complement & Average Rates:													
Partner	2	\$97,500											
Manager	3	\$84,667											
Senior	3	\$51,000											
Staff	2	\$42,000											

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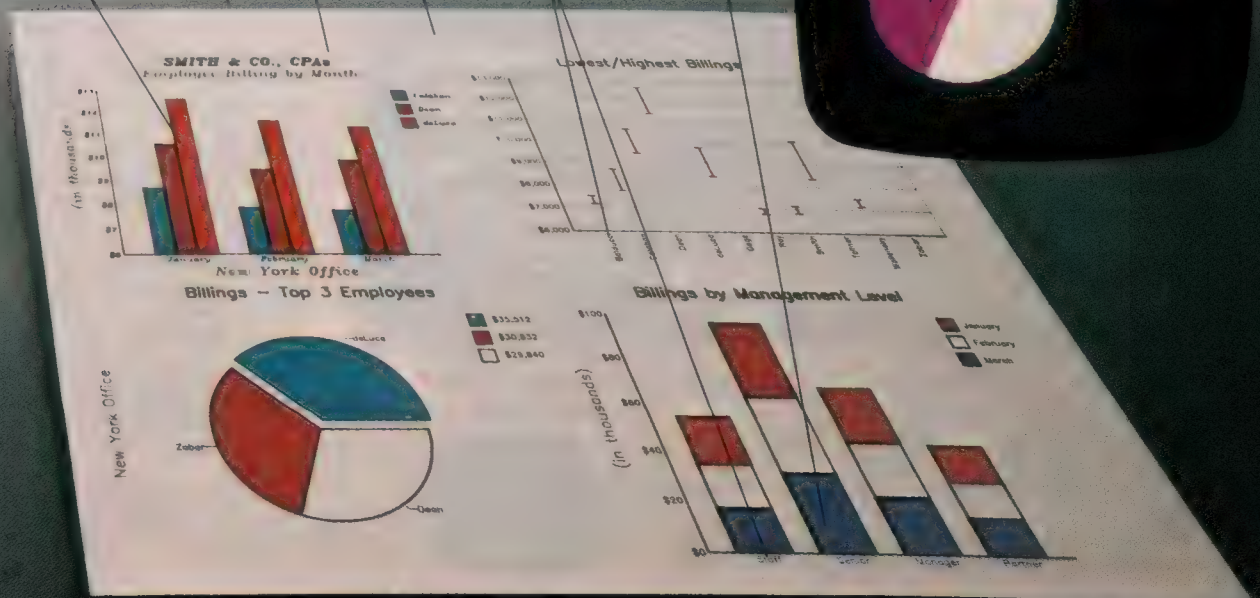
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tain software applications and then erased and reprogrammed with new instructions.

Ergonomics—An unwieldy term coined to describe the study of interactions between humans and machines.

ESC—A control character that sets up an escape sequence to allow for the development of additional operations, or signals a change in meaning.

Floppy Disk—Disk made of a flexible material, frequently plastic. Usually either 5¼ inches or 8 inches in diameter. The most popular storage medium for small computers because of their low cost and easy handling.

Graphics Plotter—Device that can provide multi-colored, hard-copy representations of complex graphic patterns.

Hard Copy—Paper printout of computer output.

Hard Disk—Rigid platter (usually aluminum) used for storing computer data. May range from 5¼ to 14 inches in diameter. Sometimes mounted in a stack on a spindle to increase a storage capacity, which is already far in excess of that provided by floppy disks.

Hard Sectoring—The physical marking of sector boundaries on a disk using punched holes (as opposed to soft sectoring, which uses recorded information to establish boundaries). Allows use of all available space for data storage.

Head—The device inside the disk drive that is used to read, write and erase information on the disk.

Host—The controlling unit in a network of computers; computer used to generate programs for use by other computers.

Input—Data fed into a computer for processing.

Integrated Circuit—Interconnected array of miniature transistors and other elements fabricated from a single crystal of semiconductor material. Complexity ranges from circuits with less than 10 logic gates to microprocessor chips that contain the complete arithmetic and logic capacity of a computer.

Interface—Devices or specifications that enable adjacent systems or system components to exchange information.

Load—Process of transferring information from a peripheral storage device to the computer's main memory.

Memory—The portion of a computer system that stores information. Internal electronic memory provides faster access than remote memory devices such as disks, but capacity pushes up the price of equipment.

Modem—A device used to transmit information between computers, generally over a telephone line.

Monitor—A video display unit capable of interpreting signals relayed by the computer into text and images. Unlike a television, a monitor is not equipped to receive broadcast signals.



Mouse—A small rolling device that is used, in conjunction with a graphics tablet, to move text and illustrations on the CRT screen.

Network—A group of computers linked together via cables or telephone lines. Computers joined in this way often share printers and memory storage media.

OEM—Abbreviation for Original Equipment Manufacturer, a category that includes system houses that offer custom configurations for hardware and software.

Online—Describes any system or piece of equipment that is in direct, interactive contact with the central processing unit.

Overwrite—Accidental placement of data in a file location that is already occupied, resulting in the destruction of the original information. May occur when the operator attempts to save more information than the disk can properly accommodate or when improper file allocation causes the end of one file to overlap the beginning of another.

Peripheral—Any device connected to a central processing unit; this includes modems, printers, plotters, terminals, disk drives and so forth.

Plotter—An image output device that allows the computer to directly control the movement of pens over a piece of paper. Used to produce charts and graphs.

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**Special Advertising Supplement
October 31, 1983**

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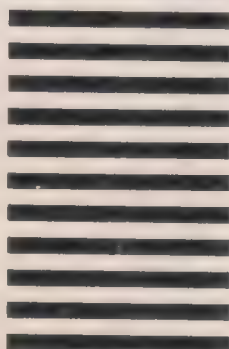
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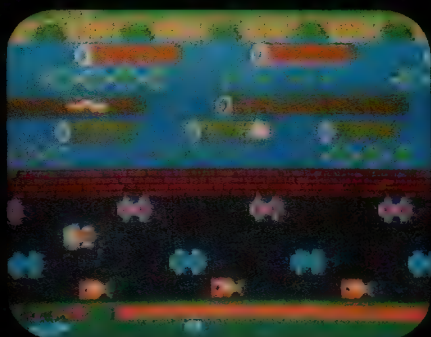
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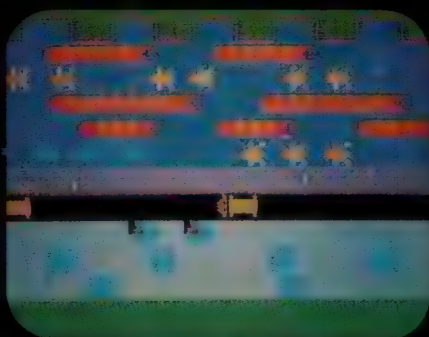
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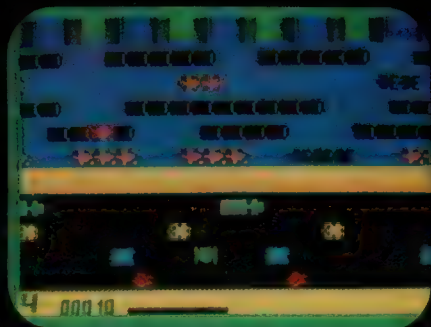
ATARI 5200



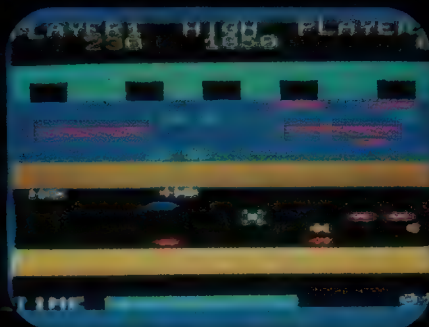
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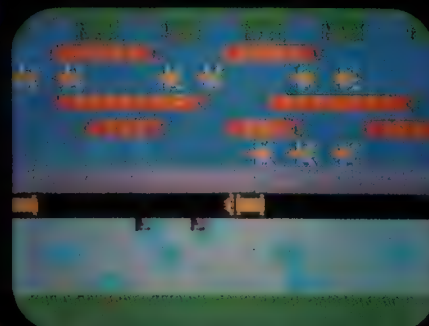
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PROM—Programmable Read-Only Memory; an internal computer memory that can be programmed once, but not re-programmed (as in EPROM).

RAM—An acronym for Random Access Memory. RAM provides quick access to any storage location point because it allows for searches that scan vertically and horizontally, instead of sequentially. Both computer internal memories and disk memories are RAM devices, while tape is a sequential storage device.

ROM—Read-Only Memory; the area of memory that cannot be altered by the user. Contains the firmware placed in memory at the point of manufacture. ROM cannot be erased by turning off the computer.

Screen Dump—The process of sending instruction signals to a printer or plotter for the purpose of translating a screen image into hard-copy form.

Semiconductor—A substance—i.e., silicon—which conducts electricity only when the voltage across it exceeds a certain value. Semiconducting materials form the basis for diodes, transistors and integrated circuits.

Tape Drive—A device that converts information stored on magnetic tape into impulses that will be accepted by a computer.

Transient—A sudden electrical surge that may be read by the computer as a signal element and result in unexplainable deviations from normal program procedure.

Turnkey System—A complete and fully operational computer system dedicated to a single activity and requiring no knowledge of operating system commands.

Virtual Memory—Use of auxiliary storage in a manner that effectively makes it an inseparable adjunct to internal memory; continuous information swapping between the two storage devices insures that there is a seemingly unlimited amount of space in internal memory.

Wrap-Around—Describes what happens when information or imagery exceeds the display area on one side of the screen; as the image "bleeds" off the right side of the screen, it will simultaneously begin to appear on the left side, thus giving the impression of having wrapped around the back of the screen. This phenomenon is quite common when one is enlarging graphic images on screen.

SHOULD YOU BUY NOW?

Both new and experienced personal computer users find themselves caught in a maelstrom of accelerating advances. There are more new choices being offered every day. More features, greater capabilities, lower prices. How can the average buyer make a prudent purchase decision? How can you hedge against the changes that will surely come?

William Moore, president of Systel, a software company in San Jose, Calif., admits that the selection process can appear overwhelming at first glance because consumers face such a wide range of choices. To simplify the process, he offers this advice:

"Thinking in the present and deciding on the basis of what will bring solutions right now is really the only sensible way to approach the process. I see far too many people confusing themselves further by trying to struggle with questions about what will serve them best three or four years downstream and whether what they buy now will be obsolete then.

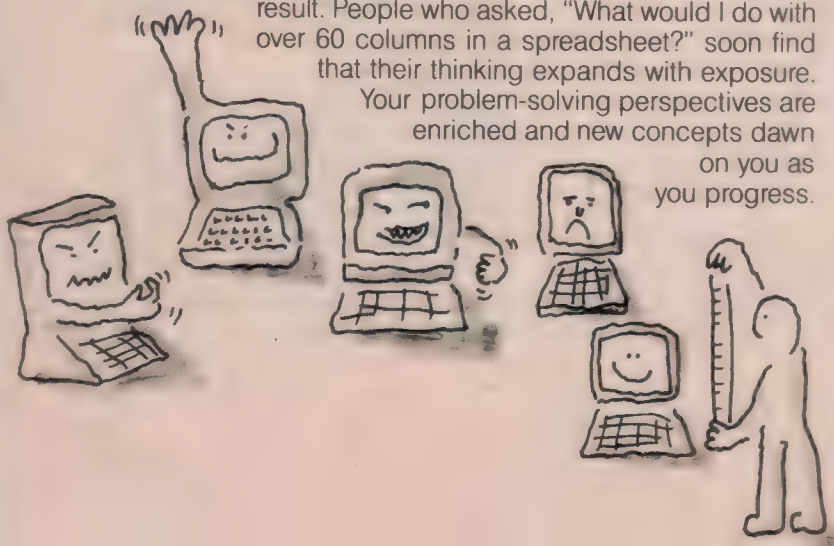
"I think this is a real mistake. First of all, even those of us in the industry don't know what is going to happen three or four years from now. And, second, if something works for you, then it is not obsolete even if there are newer products on the market."

Perhaps the most solid advice is to follow the pattern presented in this special supplement. Gauge your decisions by your own needs, not by the ultimate in technology. Pace your own progress, not the industry's. Buy to meet identified, existing needs and plan for growth through future expansion.

MORE IS NOT ENOUGH

When you've determined your needs, remember that computer literacy is a process, not an end result. People who asked, "What would I do with over 60 columns in a spreadsheet?" soon find that their thinking expands with exposure.

Your problem-solving perspectives are enriched and new concepts dawn on you as you progress.



As your proficiency increases, you can expect to outgrow your first hardware configuration, and perhaps find that your growing needs require new software solutions.

Whether you expand your computer with add-ons, or whether you "trade up" to a more advanced model, is a price/performance decision that only you can make. Whether you convert the information you want to process to new software programs, or plan ahead with your first purchase, is another consideration.

If you want to do serious information processing—or even run your business—on a personal computer, the decision-making process remains the same: Clearly define your objective, state your needs in software terms, identify the hardware choices that can run the software. Just as hardware and software developments are bringing state-of-the-art capabilities within



Any quality sales outlet will arrange a sample demonstration of software as well as hardware products, to answer your questions *before* you buy.

reach, so too is personal computer literacy creating ever-broadening abilities to cope with new dimensions in the information society.

Now you're ready to go shopping without being overwhelmed. You have defined your needs, you understand the process, and you are armed with the right questions to ask. Go to it.

SIZING UP THE SOURCES

Where to buy a personal computer and software can be as perplexing and crucial a question as *what* to buy. But the process for selecting a route through the choices of mass merchandisers, computer specialty stores, business equipment dealers, mail order houses and others need not be hopeless as long as one keeps

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Introduced only recently, the personal computer already is changing the way we live, work, think, plan and play.

in mind one basic rule for survival in unfamiliar terrain.

Sticking with a knowledgeable local source is probably the most sensible move for a first-time computer buyer, according to Ed Juge, director of merchandising for Tandy Corp.'s Radio Shack Division, Fort Worth, Texas. "The one piece of advice that I give to anyone in that situation," he says, "is to pick a dealer or distributor who is local and in whom he can have some level of trust."

For most purchasers of personal computers, local source still translates to computer store. The term *computer store* covers a diverse population that includes national chains along with small independents, variety outlets and specialty operations, those who live by the discount and those who swear by the importance of value-added services. So the decision to buy from an outlet of this type leaves you with still another level of choice.

Here are some general guidelines and suggested procedures that can help to get you over the threshold of indecision:

Survey the terrain—Spend some time before your first trip checking for some obvious indicators. Ask anyone you know who has purchased a computer about where they went and the treatment they received, paying particular attention to comments about after-sale support and service. Examine ads and listings. Figure

out just how far you'd be willing to travel if equipment had to be returned for repair.

Conduct an entry check—If a store is well run, you shouldn't have more than a few minutes to wander around on your own. Neglect indicates either poor management or a deference to a preponderantly technical customer base. In either case, this sort of place would not be likely to suit the first-time buyer.

Look for evidence of activities beyond order writing. Are there demonstrator units being used by other shoppers? Do you see areas that might be used for classrooms or group meetings? If not, ask—just because you don't see them doesn't mean they don't exist. Some stores tuck such facilities away in the back of the shop or behind a partition. Is there a display of literature, and does it include anything that seems to be generated by the store itself? (An increasing number of stores send out regular newsletters or product bulletins to customers.)

When you are greeted, you should be able to pull out some notes describing the specific uses you would like a system to address. If you receive a nod and too quick an assurance that the salesperson knows *exactly* what you need, head for the door. The ideal response should be more questions. Some stores equip sales personnel with a prepared list, just to make sure that every variable has been covered before any recommendations are made.

Ask about support—There is a learning curve attached to every program and every piece of equipment. Working your way through this curve can be painless, as long as you receive adequate preparation in training and can be sure that there will be someone available to answer questions as they come up.

There is no hard-and-fast number on how many computer stores provide regular educational offerings; one industry analyst estimates the figure to be around 40 percent. At minimum, every store should provide individual instruction on the operation of everything you purchase and directions to sources of additional information (local users groups, courses offered at area adult education centers, and the like). If possible, however, it is best to choose a retailer who offers structured education as an adjunct to his other products and services, because you are then assured not only of a good start, but also access to continuing education. Often, the purchase price entitles you to one-on-one instruction with the salesperson and to free attendance at a course conducted by a professional trainer.



PLANNING YOUR PURCHASES

A step-by-step shopping guide to personal computers. Follow the chart in collecting information to find the personal computer that's right for you.

1. Define your project

2. Identify your software

3. Select compatible hardware

4. You will need:

Shop and compare

	A	B	C	D	Notes
8 or 16 bits					
Memory capacity (standard/maximum RAM)					
Additional memory: Cassettes Floppy Disk Drive(s) Hard Disk Drive					
Future expansion: Room for Slotware					
Input/Output ports: Serial Parallel					
Terminal: Size Screen color					
Printer: Thermal Dot-matrix Daisywheel					
Modem					
Documentation					



Software packages, offered by a host of reputable manufacturers, make perfect gifts for the computer user in the upcoming holiday season.

"Hand-holding" on specific questions and problems is another issue. You can almost count on uncovering a number of mysteries in the first couple of months you use your personal computer. And you should be able to know that you can depend upon your retailer for answers. It is not enough to ask the salesperson whether you may call with questions. "We provide the security blanket for people," says Steven Watson, president of ComputerLand of Boston. Pin things down and ask whether there is a trained technician on the staff who knows the ins and outs of the equipment you are considering. Then take the issue one step further and ask for the names of some customers who have purchased the same system and lived with it for long enough to have passed through the hand-holding stage.

Face the unthinkable—"What happens if it breaks?" is the most important and least fre-

quently asked question in the entire purchasing dialog. The facts are that some software has bugs, some equipment does arrive with defects, and even good machines come up with ailments once in a while.

Here are some service issues you really should discuss with your retailer:

—Pre-testing of equipment. Some stores proclaim that they do not believe in unopened boxes, which means they try out everything before they give it to you. This is a very real benefit and, if it isn't mentioned, you should ask.

—Service contracts are usually fairly standard, but there are some things that are frequently not specified that may turn out to be of great importance, such as turnaround time. If possible, you should get the retailer to specify what his standard time for repairs is, and what provisions he can make for you during that interval. A small number of stores guarantee one-day turnaround on repairs, and an even smaller number back this up with the promise of loaner equipment in case they are unable to meet that deadline. A more common but still better-than-average offering would be guaranteed return of equipment within three working days, with rental arrangements as an option to carry you through.

On-site service is seldom offered for personal computers, although there are sometimes exceptions in the case of a business user. Pickup and delivery is sometimes part of the service offering and could provide a very meaningful point of difference between two otherwise comparable retailers.

—Spare inventory. Discuss this issue in depth, because it can mean the difference be-

tween a 30-day trip to and from the factory for a piece of equipment you've literally discovered you cannot live without, and a mere gloomy day or two. The retailer who maintains a healthy inventory of parts will be very happy to describe it to you.

GIVING AND HINTING

This holiday season, personal computers will rank high among the preferred gifts to give... and to hint for. With prices from \$150 to over \$5,000, chances are there's a personal computer to fit every occasion. But beware: The gift you give may find its way to the back of a closet, rather than become a career boost or a home companion.

Think about gift giving in context of the computer experience. Just as you need ring sizes, neck sizes and personal preferences, you now have to get to know the computer model, memory size and software library of the recipient. Giving software, for example, is like buying records or videotapes for gifts.

If you are hinting, make it clear "what size you wear," what accessories you wish you had, what expansions or what software titles you want.

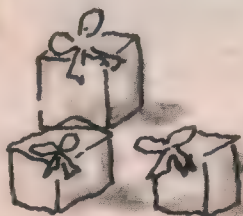
If you are giving, think about the computer literacy barrier. You can give the gift of the future, if you remember to begin at the beginning. It is better to leave the major decisions to the user and concentrate on enhancements. Select software with tutorials and programs that add a new challenge, such as computer games that augment any computer enthusiast's library.

If you are giving a new computer—say a new portable with a comprehensive software selection included—think about also including entrance at one of the computer courses offered by a local retailer or educational institution.

Or, consider giving a gift certificate to the non-user, so that he can select the software and hardware he truly wants. That selection process is also an important learning step for the tyro.



The pleasures and benefits of the personal computer are yours to enjoy. The PC: it's good reason to celebrate.



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Leading Edge Word Processing	MS-DOS	PLM	Cursor control by character, word, line, sentence, screen & page (forward & backward) and "Go to Page." "Recall" insert, delete, block delete. "Block" insert, delete. Cut and paste.	\$295.00
Radio Shack/ TRS-80, Model 100 Portable Computer	TRS-DOS	BASIC	Five Built-in Application Programs: • Direct connect autodial modem • RS-232C programmable to 19,200 Baud • Parallel Printer Interface • Bar Code Reader Interface • Cassette Interface.	\$799.00
Texas Instruments/ TI-99/4A Home Computer	TIOS	BASIC, Extended BASIC, Pascal, PILOT, FORTH	Speech synthesizer accessory. Built-in BASIC. Memory 16K to 48K.	\$149.95 minus \$50 rebate from TI.
TI Business System 300, 600 & 800 Series	DXID DNOS (600 & 800 Series)	COBOL BASIC FORTRAN Pascal	System to system compatibility protects hardware and software investment	\$10,000-\$85,000
TI Professional Computer	MS-DOS CP/M-86 Concurrent CP/M-86 UCSD/p-System	BASIC COBOL FORTRAN Pascal	Easier to use keyboard. High Resolution Monitors capable of 8 simultaneous colors or shades. Built-in mass memory (up to 10 Mb). Speech Command™ Voice Recognition System.	\$2,195.00—Includes 64K RAM, Low Profile Keyboard, 12" Monochrome Display Unit, Single 320K Diskette Drive
Toshiba/P 1350 Three-in-One printer	None	None	Letter-quality printing @ 100 cps Draft-quality printing @ 192 cps Prints dot addressable graphics 24 pin replaceable print head IBM compatible	\$2,195
Wang Professional Computer	MS-DOS Options on CP/M and UCSD/p-System	BASIC COBOL FORTRAN Pascal	Communications and networking capabilities. Wang Word Processing. 8086-Based, full 16-bit machine. Universal work station. Operates as a stand-alone, in a local loop network, and with Wang and other systems. Availability of core, 3rd party and distributed software.	From \$2,595.00
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Knoware Software from Knoware Inc.	Disk	Color graphics monitor	IBM-PC, XT Apple II +, IIe	Approx. \$95.00
Lotus 1-2-3	5 1/4" Floppy Disk	OKIDATA Microline Series 82A, 83A, 84, 92, 93 Anadex 9620A Silent Scribe Printer NEC 8023 Printer Strobe 100 Color Plotter Sweet P Color Plotter IBM Graphics Printer Epson FX80, MX80, MX100 HP 7470A Color Plotter INS Prism 80 & 132 Color Printers	IBM-PC, XT Compaq Columbia TI Professional Zenith Z100 Bytec Hyperion	\$495.00
Microsoft Multiplan	Disk	None	IBM-PC Apple MS-DOS CP/M-80	\$275.00
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Software Systems/Multimate Word Processing	Disk	None	IBM-PC Hyperion Columbia Compaq Corona Chameleon	\$495.00
Sorcim Supercalc ³ Electronic Spreadsheet	5 1/4" Disk	Epson printers, MX80/100 with Graphtrax or FX 80/100 All Hewlett-Packard plotters (including 7470 and 7475), cable 17255 B IBM instruments xy/749	IBM-PC, XT IBM compatibles	\$395.00
Spinnaker/Fraction Fever	ROM	None	Commodore 64 Atari	\$ 39.95
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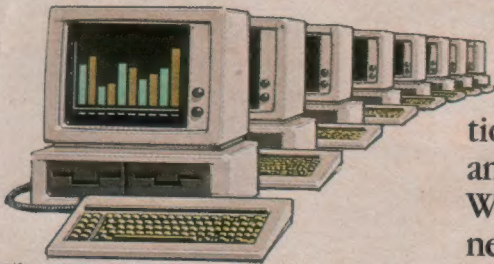
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